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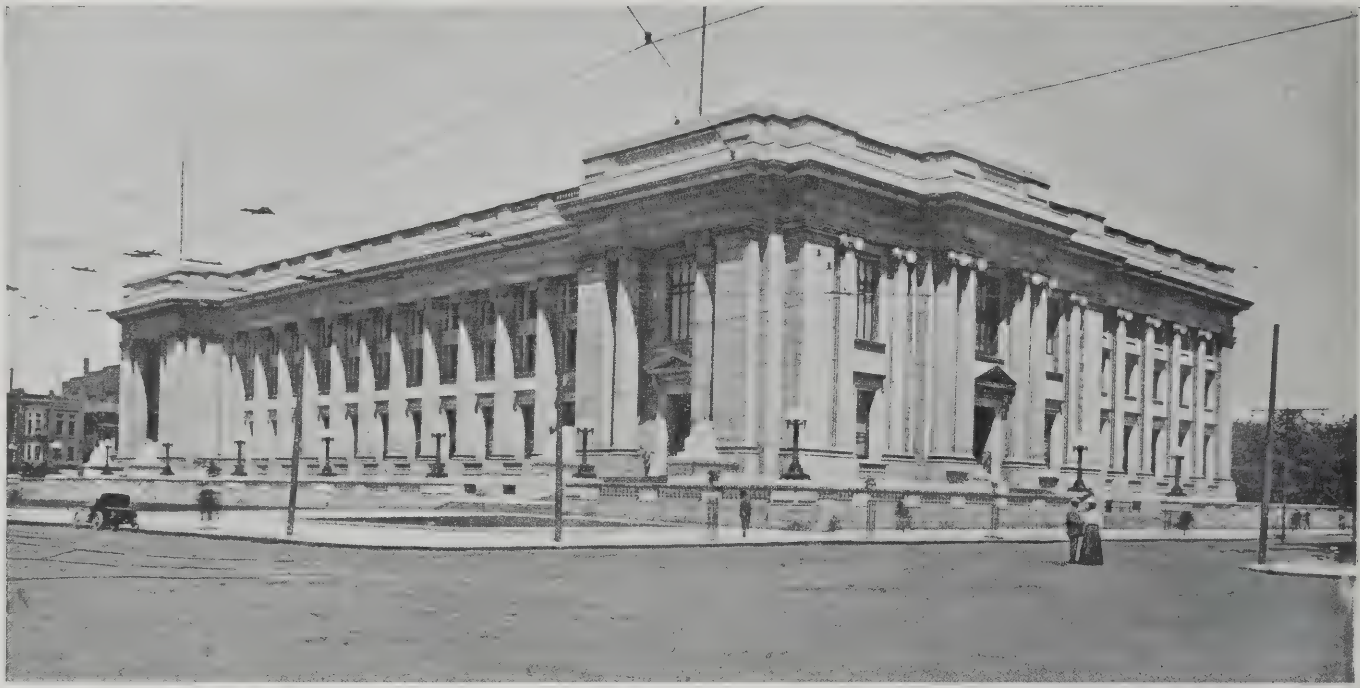

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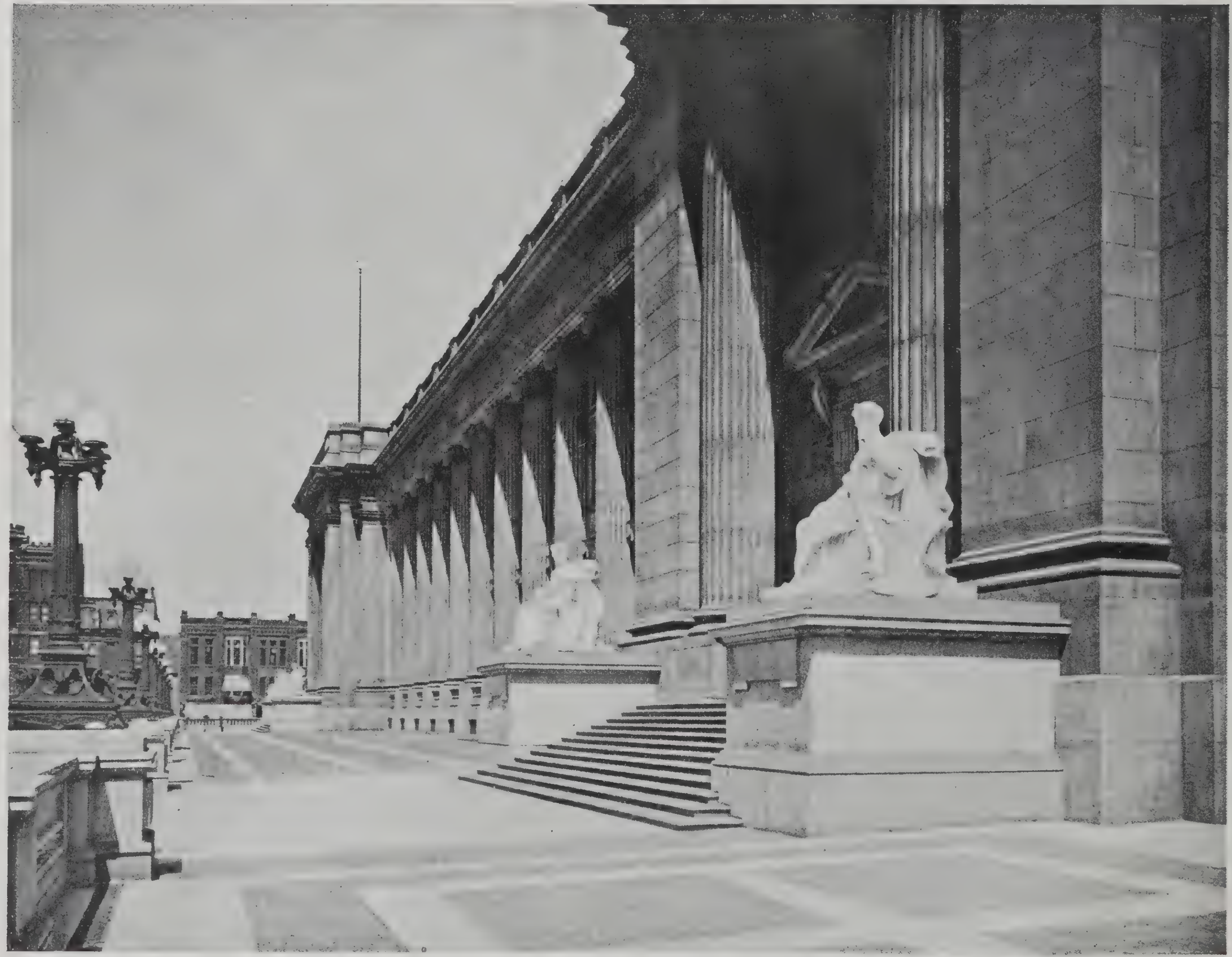

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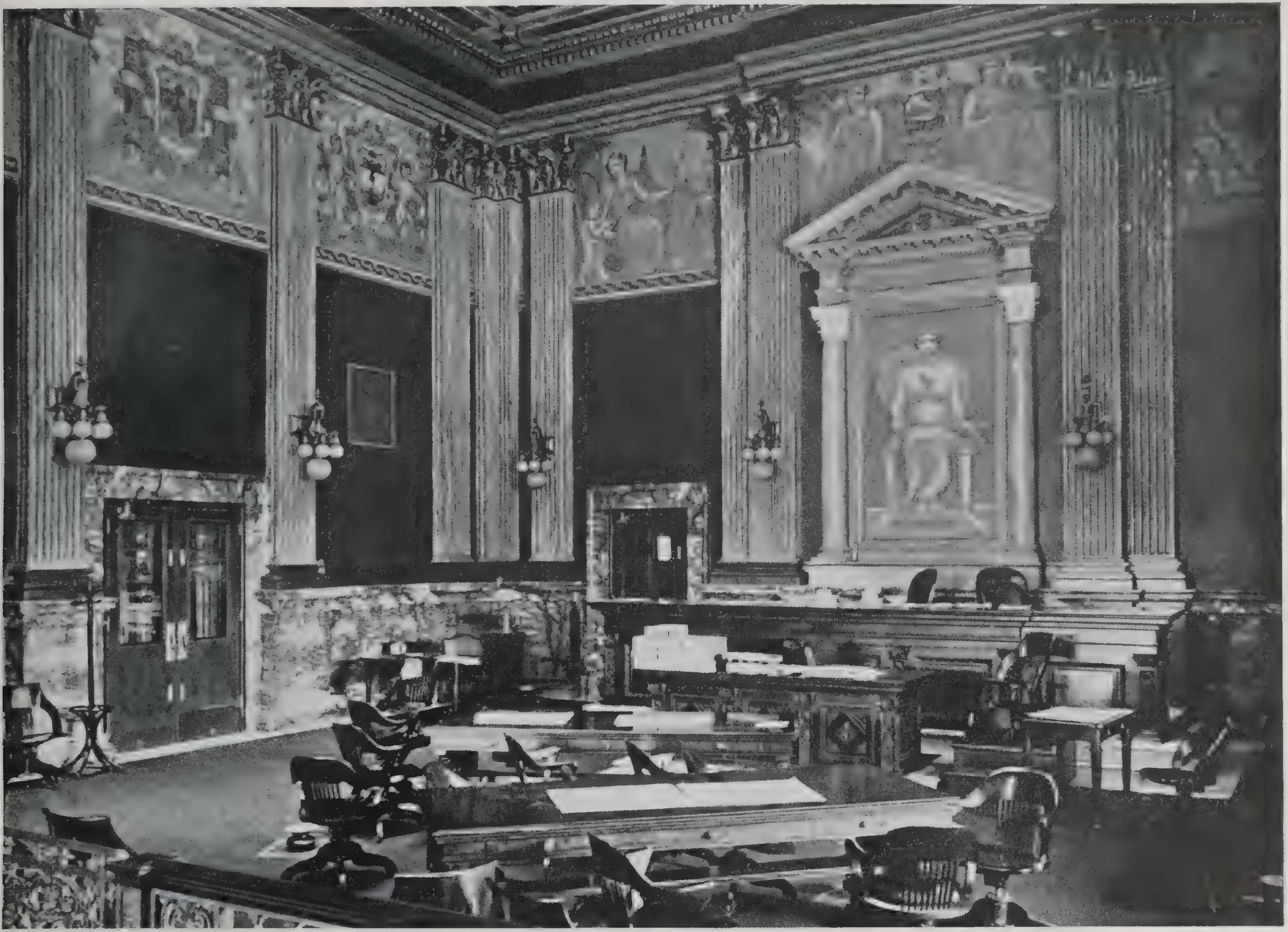

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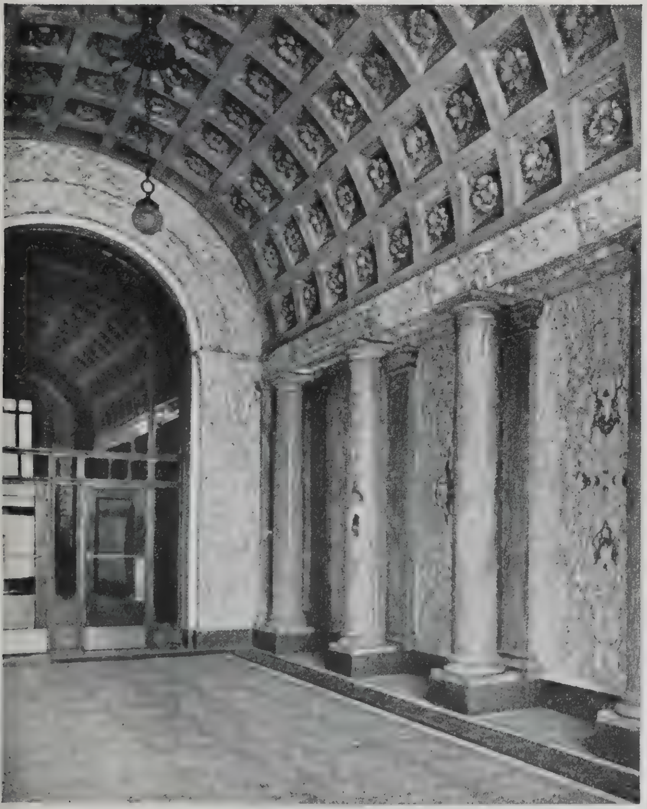

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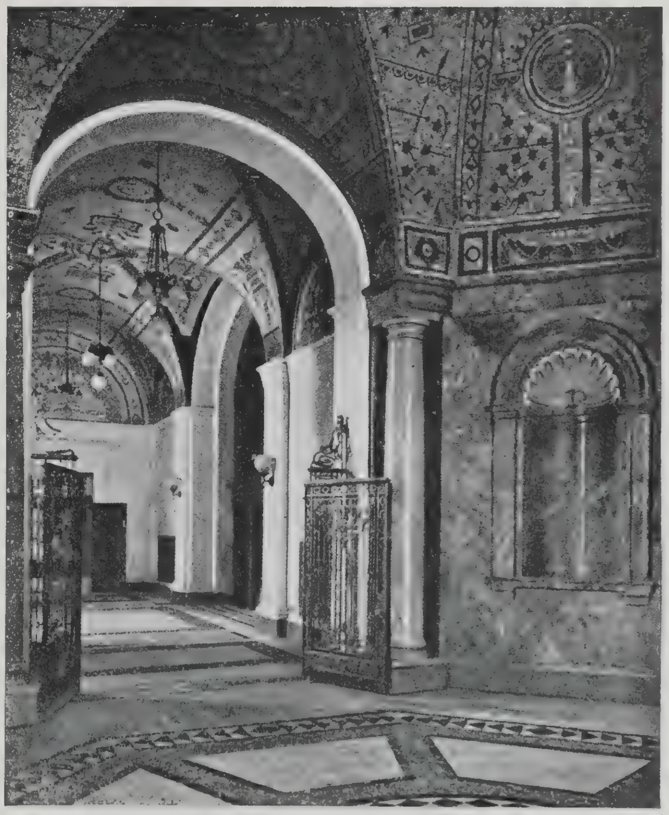

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Impressionism in Architecture THERE is one great movement in modern architectural thought which distinguishes it from the past. It is a method of looking at things which is somewhat difficult to define, but which has sufficient in common with what we are accustomed to call impressionism in painting for us to use the same term to distinguish this movement in architecture. Just as in painting, impressionism is not novel—it has had exponents in the past—but the general trend of modern thought is different to the general trend of past thought. The break came when the architect drew away from the Guild, when he became self-conscious, and took to theatrical display. If we seek for impressionism in the past we find it in the west front of Peterborough Cathedral, in the Flamboyant of France, in the Italian Renaissance, and in our own English Renaissance in the work of Vanbrugh. The chief responsibility for its introduction must rest with the architect's study of sketching as an art in itself. We see this in the work of Piranesi, whose drawings inspired Dance's Newgate. Draughtsmanship allowed an impression to be recorded on paper. It has led to impressionism in *form*. But another characteristic of latter-day impressionism in architecture distinguishes it from even later Renaissance work—that is, appreciation for texture and material. This again is not new, for it is found in Indian, Japanese, Byzantine and Gothic architecture. Classic architects sought solely for abstract beauty of form. Modern French design belongs to impressionism in form. Our own Arts and Crafts school has inclined mostly to impressionism in material; and Germany is following much the same line. Of recent years, however, we have seen in this country and in America a tendency to combine the two. It is a distinguishing characteristic of architectural design that practical necessity acts as a drag on first conceptions. This hampering of imaginative idealism is mostly advantageous, but sometimes disadvantageous. The modern architect being a self-conscious artist, the greater expression of his personality in design is to be welcomed—of course always provided he has genius and education.

The Matron and the Architect. THERE is nothing like getting the opinion of the other man—and, in some cases, the other woman. Hence we make no excuse for drawing attention to a protest which appears in "The Nursing Times" against the abhorrent practice of hospitals being erected without any consultation with the matron. Our contemporary says: "Although the matron knows nothing of architecture, she does know, and rather better than anyone else, the practical everyday needs of hospital buildings, just as every woman realises the need of cupboards in houses when fine corridors and beautiful arches fill the mind of the architect. In some of our new hospitals the matrons have asked in vain for sisters' sitting-rooms off their wards." Hospital architects, please note.

New, True, or Neither

It is not altogether a mistake perhaps for the man immersed in building affairs to turn aside sometimes from the ethics of damp-courses and the fierce joys of ancient lights. In this column the endeavour will be made from week to week to give some information which is not found in the best text-books, and to touch, with as light a hand as may be, subjects not altogether useless, and not altogether useful.

* * *

Architectural education is a good deal to the front just now. What would the wise ones of the R.I.B.A. say to Sir Balthazar Gerbier? In 1649 he opened an academy in Bethnal Green where he taught not only architecture, perspective drawing, limning and engraving, but such inconsidered trifles as astronomy, navigation, fortification, fireworks, military discipline, the art of well-speaking and civil discipline, &c., &c. Not content with Bethnal Green he must needs run an academy for foreign languages in Whitefriars.

Truly a Polytechnic under one hat.

* * *

It is a pity the R.I.B.A. educational authorities cannot copy the genial Balthazar's ideas of a liberal education. In the light of his attainments the modern syllabus is strangely inadequate. I would not insist on one professor taking all the subjects. The following would perhaps be a reasonable division of labour:—

Fireworks—Professor Halsey Ricardo.

Military discipline—Colonel Prendergast.

The art of well-speaking—Professor Leonard Stokes.

I think it would be found that there would be a rush for these classes.

* * *

It is rumoured that architects proposing to compete for the L.C.C. County Hall are asking for the following conditions to be included in the instructions to competitors:—

1. Competitors under the age of 12 are barred.

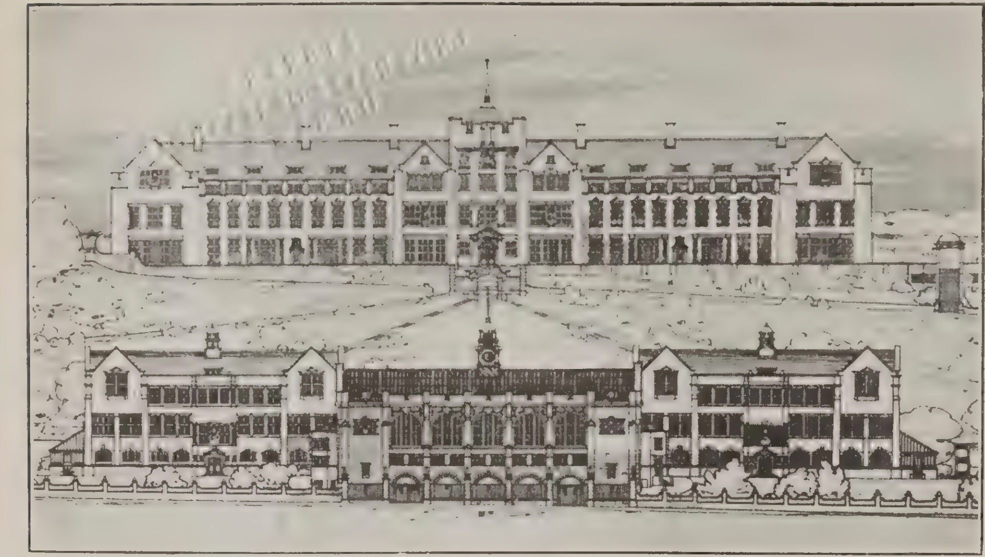
2. No assessor to go into partnership with the successful competitor.

After all, a county hall is not a cathedral.

* * *

The contents bills of the evening papers have recently been very full of the blessed word "compromise." It has been in the air and politicians seemed to have kept it there. Architects have been wiser, and have brought it down to the ground and built it up in bricks and mortar. Why hasn't someone written something really luminous about the Spirit of Compromise in Architecture? There are multitudes of texts. Take All Souls', Langham Place. It is a building comic enough in some ways, but surely the spire in its mixture of Gothic form and Classic detail is a miracle of compromise. Will Mr. Reginald Blomfield not pour out his passionate soul for our enlightenment?

The Looker-on.



SELECTED DESIGN: GENERAL ELEVATION, SHOWING GROUPING.
HENRY T. HARE, F.R.I.B.A., ARCHITECT.

BANGOR UNIVERSITY COLLEGE COMPETITION.

In the early part of last year the Council of the University College of North Wales advertised for architects with experience in the planning of scholastic buildings to submit their names for selection as competitors for the new buildings proposed to be erected at Bangor. From the numerous applications only five architects were specially invited. These were Mr. Henry T. Hare, Mr. Arnold Mitchell, Mr. A. Marshall Mackenzie, Mr. J. Francis Doyle and Mr. W. D. Caröe. The last-named competitor did not submit a design. Ample time was allowed for the preparation of the drawings, and these were received on November 30th. For the guidance of architects the Council supplied sketch plans, together with conditions and a schedule of accommodation. The architects were at liberty to use their own discretion with regard to the grouping of the buildings and the disposition of them upon the site, except that the arts and administrative building had to be placed on the south-east side of the upper portion of the site, facing the town of Bangor, and the chemical and physical departments on the same portion of the site, facing College Road. The library had also to be placed on the higher level and the day training department also, if possible. The agricultural and mining departments, it was suggested, should be placed on the lower level.

This arrangement lends itself to the natural difficulties of the ground, which is practically a large hillside with two lower terraces towards the town and main road, and a fairly flat plateau at the rear and top of the hill. The levels showed roughly a fall of about 160ft. from the plateau to the main road, which is 400ft. in front.

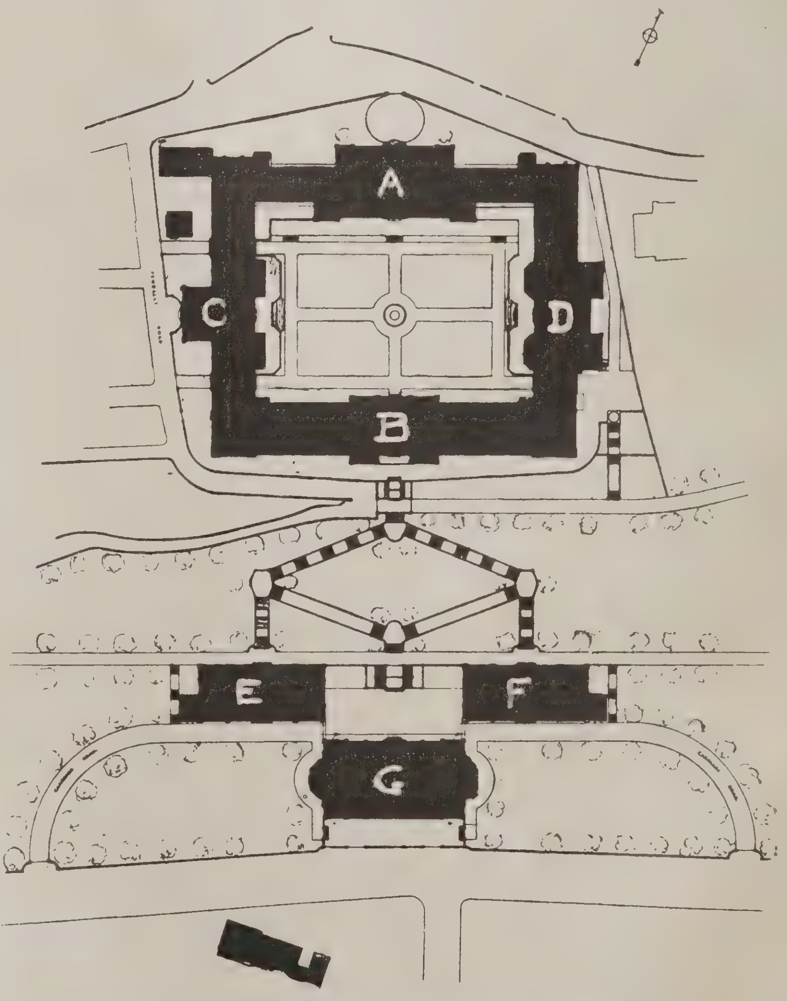
The main entrance is from this lower way, and the nature of the site offers an exceptional opportunity for a fine group of buildings. For the present it is intended to proceed only with that portion of the scheme which includes the arts and administrative departments and the library, at a cost of about £50,000. The whole scheme is limited to £150,000 for the buildings and grounds, including fees, but exclusive of furnishing. All the external walls had to be faced with stone or quarried granite from the neighbouring quarries or adjacent counties of North Wales, or English quarries not far distant, according to the conditions, which were reasonable and fair in every respect. The architect whose design is placed first will receive £250, and each of the remaining competitors a premium of £150.

After consultation with the president of the Royal Institute of British Architects, the University Council appointed Sir Aston Webb, R.A., as assessor, and his award has been made known, although the appointment of the architect is not quite officially settled. All the designs for the new college buildings are on public exhibition in the College Hall, Bangor, until Saturday next, January 5th.

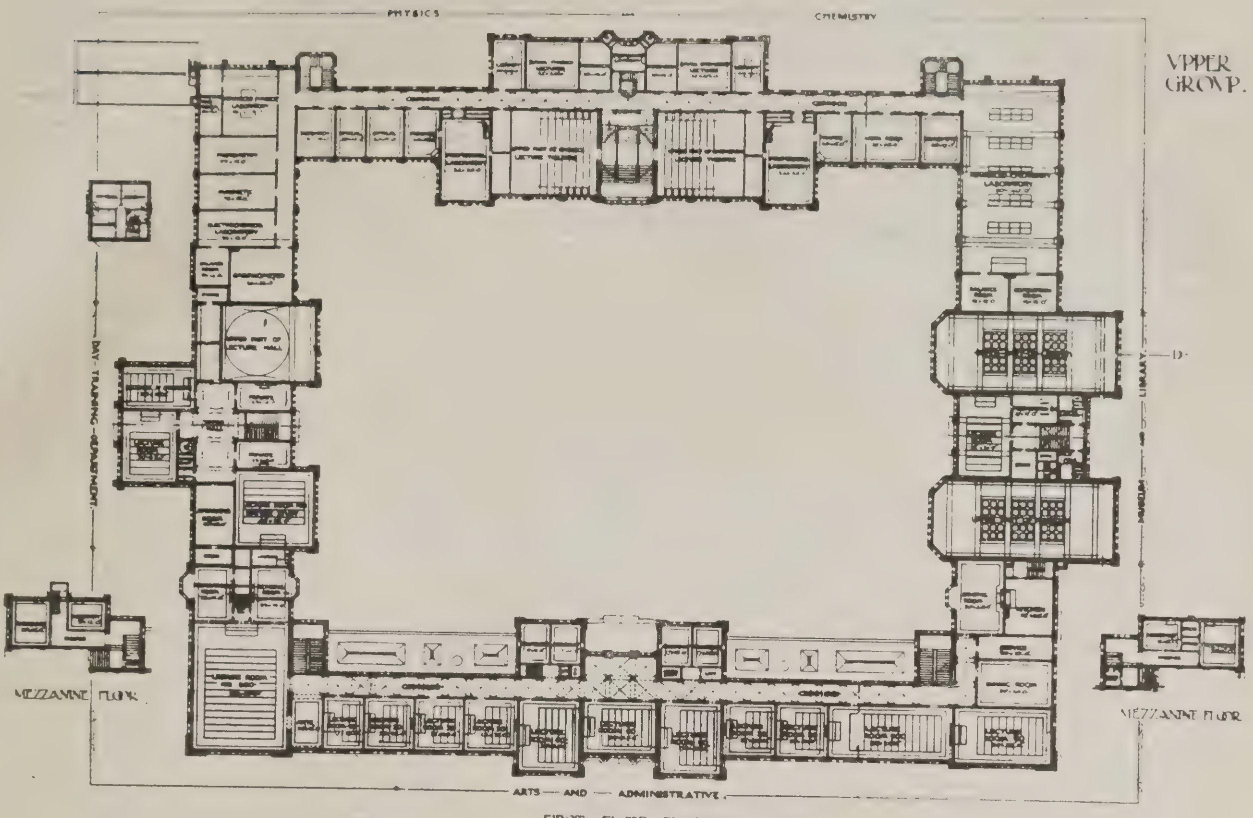
Design Placed First.

The first place has been accorded to Mr. Henry T. Hare, of London, with a well-thought-out and most carefully-drawn scheme. On referring to the block plan, it will be noticed that the buildings are symmetrically arranged and present a good outline. Facing the main road is the great hall, approached from a spacious forecourt; immediately behind and to the right and left are the mining and agriculture and the botany and zoology buildings, forming the lower group. At the rear is a series of pathways and steps which lead up to the arts and administrative departments, comprising the upper group of buildings. These steps considerably detract from the appearance of the plan: it would have been better if, with terracing, they had been concentrated at certain positions and not scattered over the hillside at awkward angles.

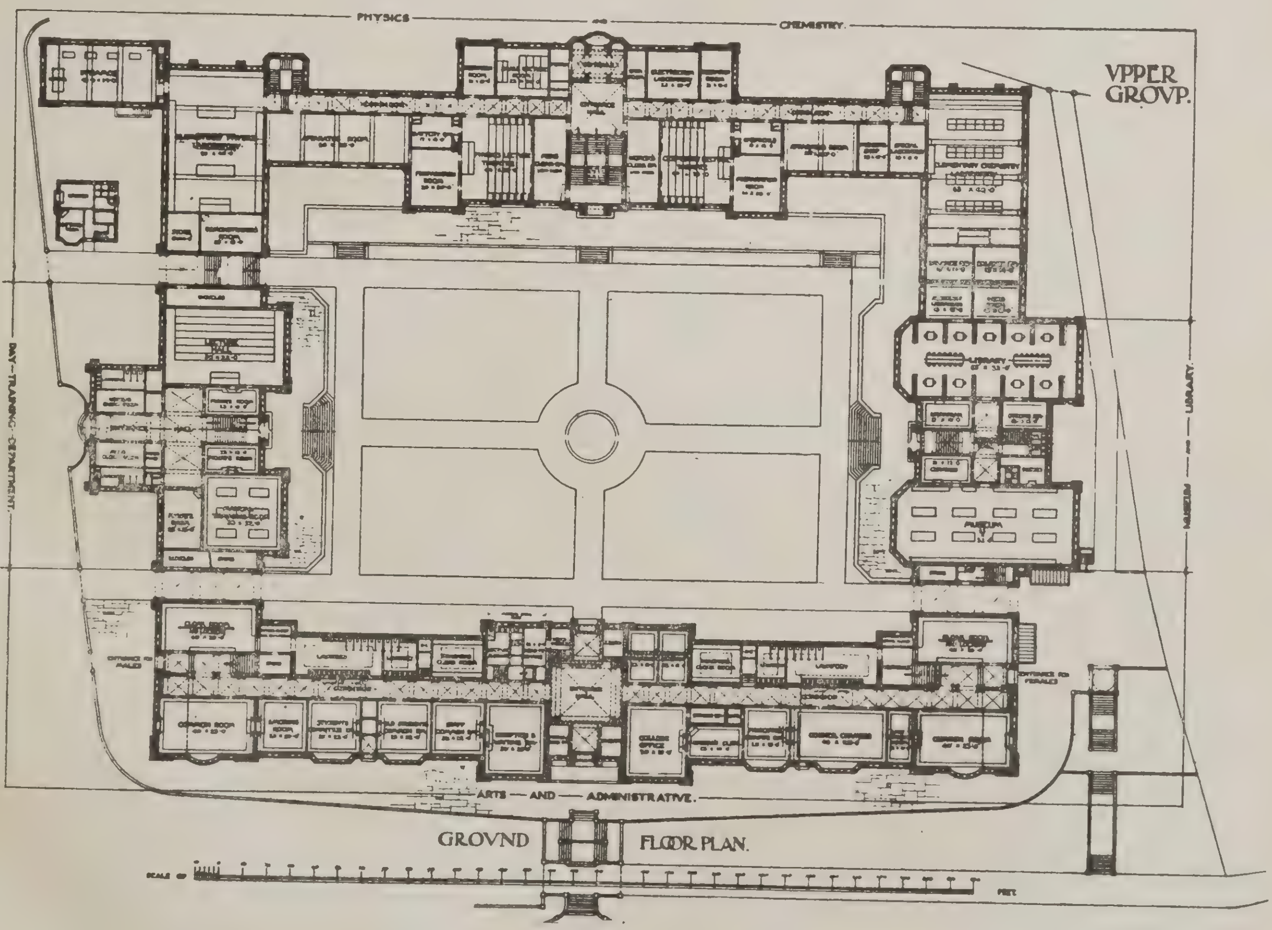
The upper group of buildings (arts and administrative) forms a square enclosing a large quadrangle, with good access to all minor departments. As a whole, the buildings are well planned, and the author has cleverly arranged the departments on each side of the square, so as to form one large dignified group, while each department is isolated by party walls or pass doors. Only a few rooms are of inconvenient length and lighted by the short ends, but this is a minor objection considering the large number of rooms of different areas which were required by the competition conditions. The sections



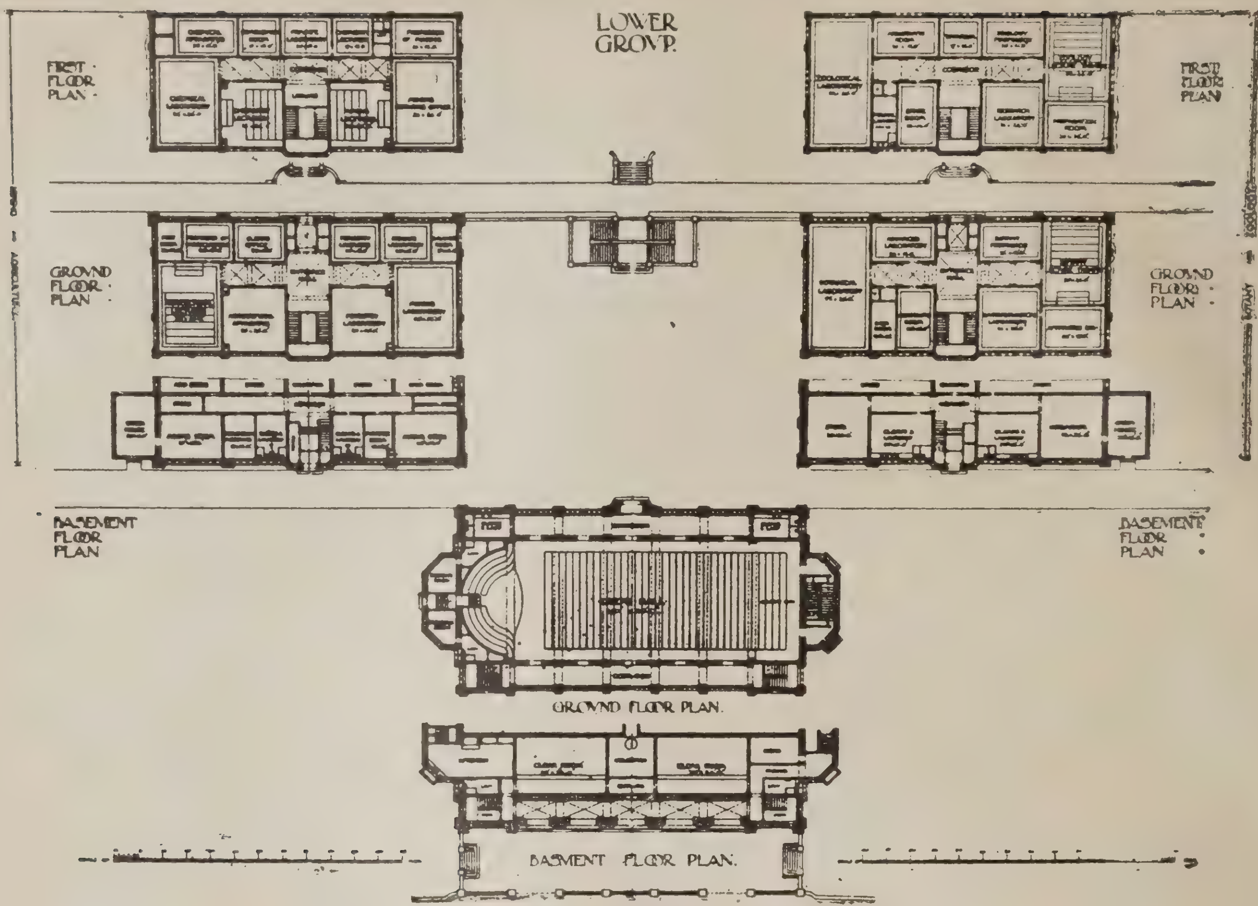
BLOCK PLAN OF SELECTED DESIGN.
A, physics and chemistry; B, arts and administrative; C, day training department; D, library and museum; E, mining and agriculture; F, botany and zoology; G, great hall.



FIRST FLOOR PLAN.



UNIVERSITY COLLEGE OF NORTH WALES, BANGOR: FIRST-PREMIATED DESIGN, UPPER GROUP. HENRY T. HARE, F.R.I.B.A., ARCHITECT.



UNIVERSITY COLLEGE OF NORTH WALES, BANGOR: PLANS OF FIRST PREMIATED DESIGN, LOWER GROUP. HENRY T. HARE, F.R.I.B.A., ARCHITECT.

suggest that some of the principal rooms—notably the library—will display a good appearance architecturally, by reason of the well-balanced plan and the refined detail illustrated on the drawings. All the sanitary arrangements could have been isolated or disconnected—only one competitor has seriously considered this important point. The drawings are neatly finished, particularly the elevations. In design, the style adopted is typically English, and is based on the best collegiate work as treated by the author in his own manner. Some of the elevations are rather domestic in character, but this is preferable to the classic severity shown by some of the designs.

Other Designs.

No. 1 is the work of Mr. Arnold Mitchell. In plan this scheme is self-contained, an endeavour having been made to house as many departments as possible under one roof. The plans suffer on that account, as the plateau portion of the site did not permit of this arrangement in a comfortable way. Many of the corridors are badly lighted, with internal courts on the small side. The relationship of the various departments is well-considered, and a good feature is the arrangement of semi-circular blocks containing lavatories and lecture theatres, giving the disconnection which is to be desired where a number of conveniences are together. But the plans, though balanced, lack openness, owing to small courts. The buildings are well designed in a bold modern treatment of Renaissance, there being twin-towers with a dome between at the end of the large hall. A striking perspective shows the grouping, but the surroundings are misplaced and do not help the composition.

No. 4, by Mr. A. Marshall Mackenzie, is a well-grouped scheme and in detail and position of departments is carried out in a similar manner to the design placed first. The departments, however, are too isolated, and look almost detached. The author is to be commended on the successful way in which he has overcome the difficulty of terracing and steps from the lower to the upper groups. This is shown clearly in a large pen-and-ink view by Mr. Alex. McGibbon. A severe Classical style is adopted, which looks monotonous and not unlike similar American university buildings.

No. 3, by Mr. J. Francis Doyle, of Liverpool, fills 14 sheets. Neither the plans nor elevations call for much comment, however, as the former lack balance and grouping. The author has overlooked the lay-out of the grounds, and some of the departments are situated at too great a distance from the administrative department to be of service.

COMPETITION FOR BIRMINGHAM COUNCIL HOUSE EXTENSION.

The award in the competition for the Birmingham Council House extension has now been made known and the designs are on exhibition in the Council House until January 10th. The competition has been a double one, there having first been a sketch competition, in which 124 designs were submitted, and the authors of 10 selected by the assessors (Sir Aston Webb and Mr. E. Ingress Bell) for the final competition. The selected architects were Messrs. Ashley and Newman, Greenaway and Newberry, Henry T. Hare, E. P. Howard, A. N. Prentice, Treadwell and Martin, Wills and Anderson, Crouch, Butler and Savage, Mansell and Mansell, and Matear and Simon.

The design placed first is No. 4 by Messrs. H. V. Ashley and Winton Newman, of 10, Gray's Inn Square, W.C. It was a condition of the competition that the extension should harmonise with the existing Council House, designed by the late Mr. Yeoville Thomason.

The extension forms an oblong block with a court in the centre, and will occupy the site acquired from the Colmore Trustees at the corner of Congreve Street and Edmund Street, extending in the rear to Margaret Street and Great Charles Street; it will have elevations to all the first three-named streets, while the space on the Great Charles Street side will be reserved for any further extension which the future may demand. When the work is completed, the Gas Department will find new quarters on the ground floor and basement, with a frontage to Edmund Street; the Congreve Street frontage will be occupied by the Health, Tramways and Housing Departments; and the Margaret Street side will be apportioned to the Education Department. Above the Gas Department will be the Art Gallery, and it is from this point that the old building and the extension will be connected by a bridge across Edmund Street. Leading from the Round Room of the present Gallery the visitor will pass across the bridge, which will form a long picture gallery to the new building.

Each of the principal departments will have its prominent main entrance, and a cart entrance on the street level from Margaret Street will give access to vehicles with goods for the various departments. The upper floor over the Congreve Street offices will be left vacant, and therefore may, if desired, be used for a Natural History Museum, which has long been contemplated. On the Great Charles Street side the frontage will be unoccupied, and may be used in the future for any further extension which becomes necessary.

The building is Renaissance in design, surmounted by a flat dome. It is to be faced with stone and is estimated to cost £150,000.

Notes on Competitions

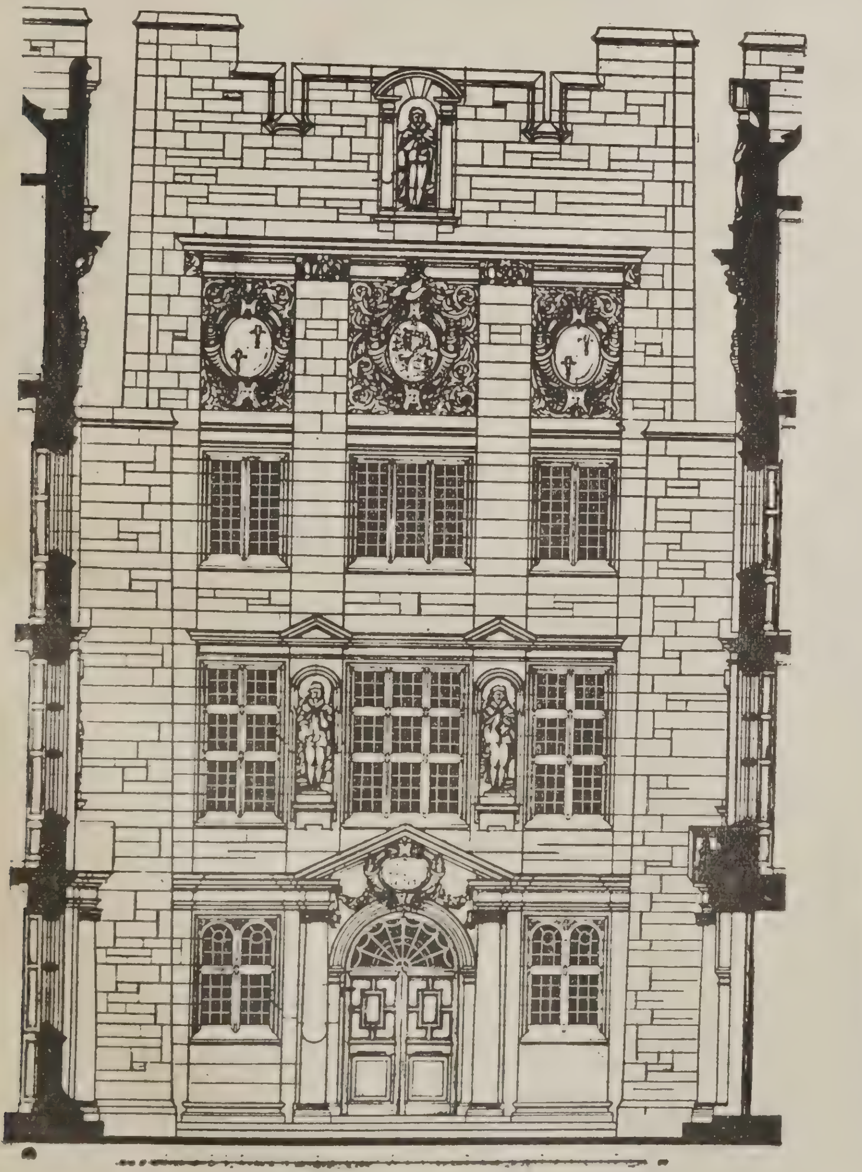
Assessors' Fees.

Not long ago a limited competition was held for a small school to be built in the country at a cost of, approximately, £1,500. The number of invited competitors was under a dozen. A majority of these petitioned the promoters for a professional assessor and stated that the President of the Royal Institute of British Architects was always willing to nominate a gentleman to fill that important post. The promoters signified their willingness to comply with the petitioners' request and communicated with the President; his nomination was made in due course and a name was sent to the promoters with the intimation that the assessor's fee would be fifty guineas. The promoters were unable to incur a fee amounting to two-thirds of that of the successful competitor's and had to abandon all idea of a professional assessor. Result—the intending competitors who petitioned declined to compete, and, being the best of those invited, their abstention caused a lowering of the standard of architectural achievement and a loss to the district. This instance is given because it bears very forcibly upon a matter which has already been hinted at in these columns—namely, that if it is desirable that all competitions be conducted by professional assessors, it is also desirable that professional assessors should be brought within the reach of all competitions. On the one hand are competitors clamouring for experts to judge their work, on the other is an ever-increasing number of promoters—more willing or better informed than formerly—desirous of doing the right thing. The wishes of both are thwarted, as in this instance, by the thoughtlessness of the only representative body of architects which has for its aims the advancement of architecture and the welfare of its members. Unfortunately it has become a custom to regard assessing as a means to obtaining a fat fee, and although it is but reasonable that special services should be met by special payment, it is essential that the fee should bear a reasonable relation to the duties involved, if the interests of all concerned are to be made lasting and the confidence of the public retained. A solution of the difficulty is not easy under the present system, for if a stated fee prove too high it would be hardly compatible with dignity to lower it. In such a case the promoters have only two courses open to them—to do without an assessor or to go elsewhere for one—either of which reflects no credit upon the R.I.B.A. The most satisfactory method would be a percentage charge commencing, say, at one per cent., and arranged on a gradually descending scale as the value of the work increased. Upon this basis the fee for assessing the school in question would have been £15.

The County Hall and the favoured few.

If there is any reason whatever for paying a limited number of architects for taking part in a competition which is otherwise open to the rest of the world, it must surely be that of offering an inducement to certain men of eminence, the abstention of whom would be little short of a national calamity. Such, in fact, was the inference drawn from the explanation of the particular policy put forward by those in authority at Spring Gardens. Public expectation not unreasonably looked for a list, international in character, with a likeness to one which emanated from the Hague a short time ago. Although it cannot be denied that the selected names possess eminence in some special degree, it has come as a surprise that many of them should have been chosen, to the exclusion of others who would appear to be better fitted for distinction in this particular instance. To those unacquainted with the personality of the powers that be it must seem as if selection has been made upon methods similar to those adopted when prizes are drawn for in a German lottery.

At next Monday's business meeting of the Royal Institute of British Architects Mr. William Woodward will direct attention to the terms of the competition for the London County Hall, with special reference to the proposal to invite certain architects to submit designs in the final stage. Mr. K. Gammell will move resolutions to the effect that competitions for public buildings should not be limited, and that the Institute should exert its influence in obtaining the abolition of the growing custom of penalising non-competing architects by retaining their deposit.

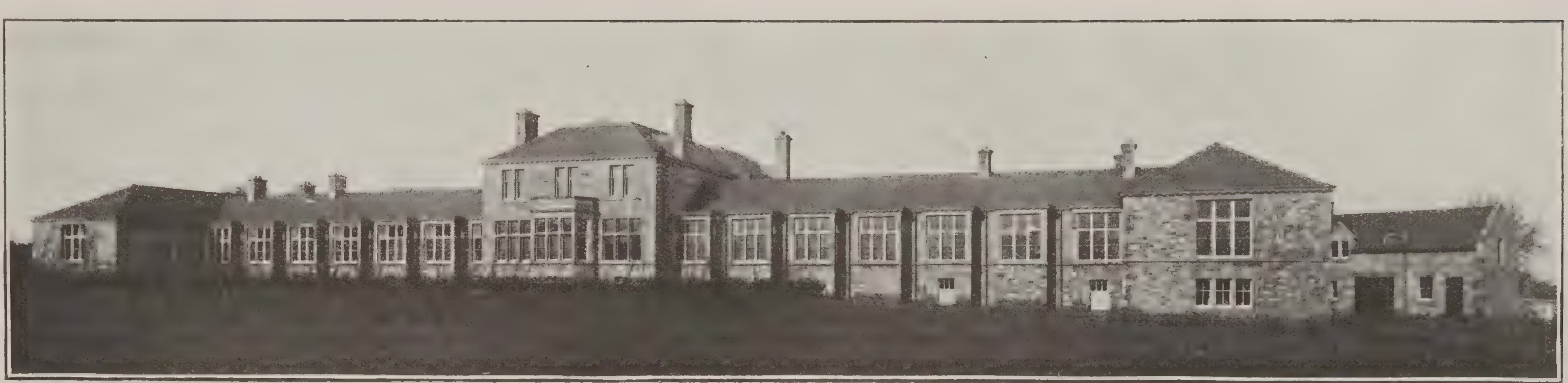


UNIVERSITY COLLEGE OF NORTH WALES, BANGOR: DETAIL OF MAIN ENTRANCE TO ARTS AND ADMINISTRATIVE BUILDING. HENRY T. HARE, F.R.I.B.A., ARCHITECT.

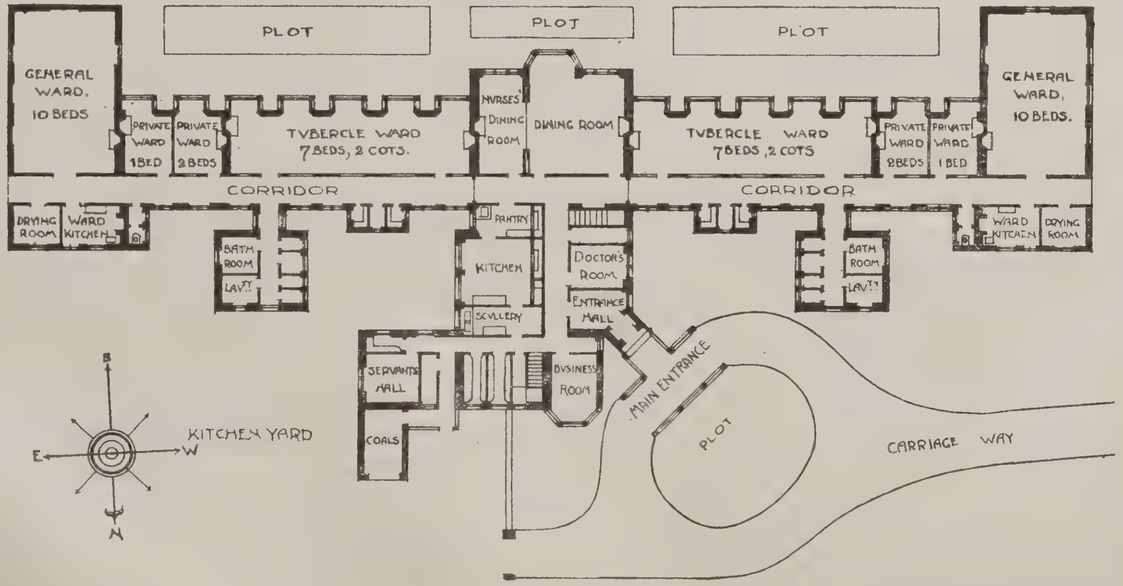
List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
Jan.	5	SECONDARY SCHOOL AT GUISELEY, LEEDS (for 200 scholars).—Name by this date to M. Rennard, secretary to Governers, Guiseley, Leeds.
Jan.	12	LAY-OUT OF RIDDRIE ESTATE, GLASGOW.—Premiums of £75, £50 and £25. Particulars from A. W. Myles, town clerk, City Chambers, Glasgow. No deposit.
Jan.	19	LIBRARY AT PLYMOUTH.—Premiums £50, £30 and £20. MUSEUM AND ART GALLERY AT PLYMOUTH. Premiums £25, £20 and £10. Limited to local architects. Particulars from Borough Librarian, Plymouth
Jan.	31	TWO BRANCH LIBRARIES AT SUNDERLAND.—Limited to local architects. Premiums £20 and £10 for each library. Particulars from John W. Moncur, borough engineer, Town Hall, Sunderland.
Feb.	1	CHILDREN'S HOSPITAL AT SUNDERLAND.—Premiums of £100, £50 and £25. Particulars from T. Robinson, secretary, Infirmary Offices, Bank Buildings, Sunderland. Deposit £1 1s.
Feb.	6	FEVER HOSPITAL AT GALWAY.—Premium £25. Particulars from R. F. Mullery, clerk to the Board of Guardians, Galway.
Feb.	16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
March	3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25 Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford Yorks. Deposit 10s. 6d.



General View of South Front.



Ground-Floor Plan.

Ward Windows on South Front.

LIBERTON COTTAGE HOSPITAL, NEAR EDINBURGH. PEDDIE AND WASHINGTON BROWNE, ARCHITECTS.

LIBERTON COTTAGE HOSPITAL.

The Liberton Cottage Hospital, near Edinburgh, is a county annexe of the Longmore Hospital for Incurables. It is intended both for consumptive and general cases. The site comprises four acres, and has a frontage to the south of 300ft. The building is constructed of rubble from the well-known quarry at Hailes, and what little dressed stone there is has come from Doddington, while the bricks are from the Whitehill brickworks near Dalkeith. There is a central administrative block two storeys high, the wards being one storey only. At each end of the building is a general ward. Accommodation is provided for 42 patients. A corridor 6ft. wide runs the whole length of the building (267ft.), and at the west end terminates in a glass-covered verandah. Lavatories open off the corridor, and drying-rooms are provided for the use of patients who get their clothes wet in the event of being caught in the rain.

All the wards face the south, and open off the corridor. The walls are tinted green and the ceilings whitened. Heating is by open fires and hot-water radiators. The windows are of the French casement type, with outside sun blinds. The floors are of teak, and the angles are rounded to prevent the lodgment of dirt. The corridor is marble-paved, and the partition between it and the wards is glazed 4ft. down from the ceiling. Fanlights open into the corridor, which is provided with windows facing the north. On the north side of the central block are placed the entrance hall, doctors' room, kitchen, servants' hall, &c., and on the first floor are the nurses' and servants' bedrooms. At the main doorway is a covered carriage porch. In the kitchen, bath-room, sculleries, &c., the floors are terrazzo, and the walls from floor to ceiling are covered with white glazed tiles. To serve as a hall for entertainments the nurses' and patients' dining-rooms are separated by a large sliding partition, which enables the two apartments to be made into one. The hospital has its own electric-light plant, the installation consisting of suction-gas producer plant, engine and dynamo, supplied by the British Westinghouse Co., with a capacity of 25-h.p.; while there has been installed a storage battery of 120 cells capable of supplying the 300 lights for eight hours. The architects for the buildings are Messrs. Peddie & Washington Browne, of Edinburgh. The total cost for site, buildings and furnishings has been fully £20,000, or about £500 per bed.

THE HISTORY OF ARCHITECTURAL EDUCATION.

A paper on this subject was read by Mr. P. H. Ellis before the last meeting of the Nottingham Architectural Society. The author said that perhaps the first organised school of architecture of which we had any record was that founded by Crossus at Rome and intended for the instruction of slaves. In order to meet the demands of his day, Constantine the Great later founded architectural schools in Europe and North-West Africa, and was even said to have offered premiums to such as would have their sons brought up as architects and to skilled workmen who would bring up their sons to their own trades. Continuing, the author next made reference to the Comacines as a link between the Roman Collegia and the art and trade guilds of the Middle Ages, Leader Scott's extravagant estimate of whose influence was quoted with considerable reserve. The earlier monastic or "Cluniac" school of architecture whose new principles were destined to produce in the 12th century monuments freed from the last Roman traditions, and the Saracenic schools, were then dealt with, followed by a historical sketch of the great Guild system which played so important a part during the Middle Ages and the sphere of whose influence was traced by the author in gradually diminishing degree down even to Wren's day. The Revived Classic movement in architecture, dating from 1416, when after centuries of oblivion the original Codex of Vitruvius was once more brought to light, and which, combined with the measurement and reproduction of the noble remains of Imperial Rome, formed the Renaissance School of early days, was then treated of. Time did not permit entering in any detail upon the modern aspect of the subject, and the author concluded with an account of the foundation of the Royal Academy in 1768, when Thomas Landby, R.A. (a native of Nottingham), was appointed the first Professor of Architecture there.

IN PARLIAMENT.

(By our Press Gallery Representative.)

Foreign Cements in British Bags.

In the House of Commons, before Christmas, Mr. John Ward asked the President of the Board of Trade whether he was aware that a large proportion of the foreign cements introduced into this country was imported in the bags of home firms, with British trade-marks attached, and sold to the home trade as British manufactured cements; and whether he would consider the advisability of taking legal proceedings against such firms under the Merchandise Marks Act.

Mr. Lloyd-George, in reply, said:—"I am informed that the Board of Customs have no reason to believe that foreign cement imported into this country is brought in bags bearing British trade-marks without an indication of the country of origin of the cement. Any such importation which came under the observations of officers of the Customs Department would be detained and a necessary condition of release would be that there should be added an indication of the country of origin or that the trade-mark should be erased. With regard, however, to this matter and also to the sale in this country of foreign cement as British, if my hon. friend will furnish me with any information on the subject that may be in his possession I shall be glad to have enquiries made."

The Old War Office Site.

Mr. M'Kenna, replying to Mr. Burdett-Coutts, said no decision had been come to with regard to the disposal of the site of the old War Office in Pall Mall, nor was one expected during the present financial year.

New Barracks at Windsor.

Mr. Haldane informed Mr. James Mason that it was proposed to proceed with the erection of barracks on the site lately acquired by the War Office adjoining the Victoria Barracks, Windsor, but the details were not yet definitely settled.

A COMPETITION FOR READERS.

We feel convinced that The Builders' Journal only requires to be better known in order that its circulation may increase enormously. We therefore offer (as we announced in our issue for last week) a prize of five guineas for the best suggestion as to how we can increase our circulation. The feasibility of the suggestions will be considered by the editors, whose judgment will be final. No doubt our friends will be glad to help us with ideas, and to see us adopt their proposals, whether they win the prize or not; therefore we reserve the right to adopt any of the suggestions which we receive. Suggestions should be submitted before or on January 10th, addressed to the Editors of The Builders' Journal, 6, Great New Street, London, E.C., and the envelopes marked "Circulation." We shall announce the result of our decision in our issue for January 16th.

THE ORDERS.

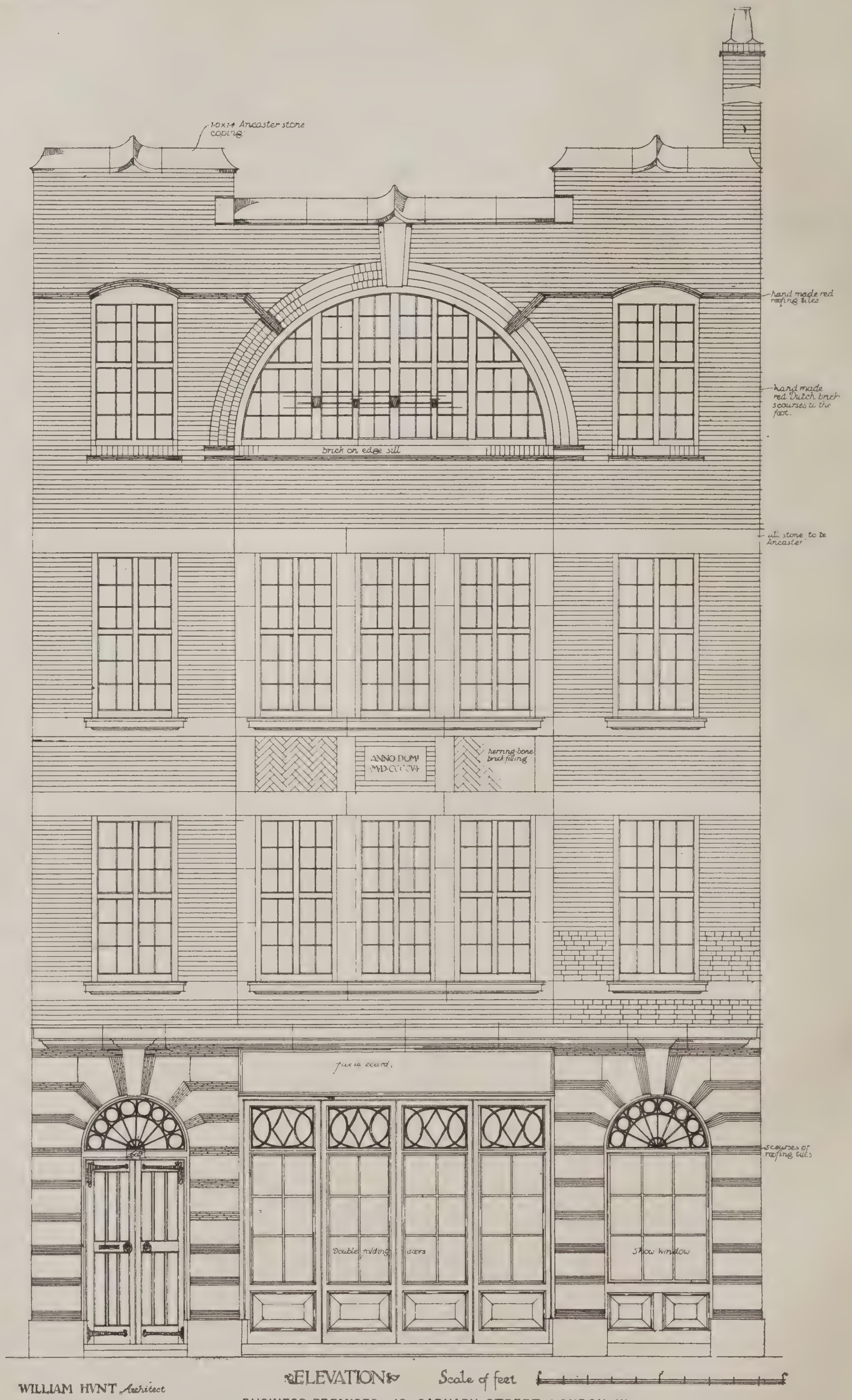
In response to suggestions, we have decided to re-publish the plates of "The Orders" which have appeared in The Builders' Journal during the past few months. Each plate will be printed separately on thin card, together with the explanatory description contributed by the authors, Messrs. Alfred W. S. Cross, M.A., F.R.I.B.A., and Alan E. Munby, M.A., so that all necessary information will be afforded. Being on thin card the plates will be thoroughly serviceable for constant use on the drawing-board. The price of each plate separately will be 6d., and all readers who may require copies should place their orders at once with the publishers, Technical Journals, Ltd., 6, Great New Street, London, E.C.

A further series of plates illustrating useful methods and memoranda for draughtsmen—a continuation of Messrs. Cross and Munby's articles on "Practical Notes for Architectural Draughtsmen"—will appear shortly in our columns, and these plates also will in time be published in separate form for use on the drawing-board.

Our Plate

United States Court House and Post-office, Indianapolis.

The views of the new Court House and Post-Office at Indianapolis which we publish as a centre plate this week form another representative addition to the series of American public buildings which we have illustrated from time to time. This building is still another instance of the fine monumental manner in which American architects excel, though we, in this country, find it so very difficult to attain. The reason no doubt is to be found in the system of training followed in the American architectural schools, where the large ideas of the Ecole des Beaux Arts are taken as models. The detail on the building is also very good; it is, however, of secondary merit compared with the general mass and proportion of the structure. On either side of the main entrances are figures of "The Law," these grouping well with the architecture and being well placed. We have no descriptive particulars of the building, but the illustrations are sufficiently clear to speak for themselves.


1·0×1·4 Ancaster stone coping
hand made red roofing tiles
hand made red Dutch brick 5 courses to the foot.
brick on edge sill
all stone to be Ancaster
ANNO DOMI MDCCCCVI
herring-bone brick filling
facia board
5 courses of roofing tiles
Double folding doors
Show window
ELEVATION
Scale of feet
WILLIAM HVNT Architect

BUSINESS PREMISES, 48, CARNABY STREET, LONDON, W.

The materials used in this building are hand-made 7-in. by 2-in. Dutch bricks, five courses to the foot (four of stretchers and one of headers), with Ancaster stone. The window frames are of deal, painted white, with iron casements. Doors are painted a dull peacock green with wrought-iron furniture. The flat roof is covered with lead. Mr. William Hunt, of Donington House, Norfolk Street, Strand, is the architect.

Notes and News

A Saxon Arch has been disclosed during alterations at Tollesbury Church. It dates back to the first half of the ninth century.

New Council Buildings at Rushden have been erected at the junction of Newton Road and Park Road, from designs by the Town Surveyor, Mr. W. B. Madin.

Change of Address.—Messrs. Spalding & Spalding, architects, have moved to new offices at 36 and 37, King Street, Cheapside, E.C. Telephone number "1167 Central," as before.

The new Hicks' Theatre in Shaftesbury Avenue, London, was designed by Mr. W. G. R. Sprague. The stage is 70ft. wide and 40ft. deep, while the auditorium will seat about 1,200 people.

A new Fish Market at Lerwick is to be erected from designs by Mr. James Barron, of Aberdeen. The contract, amounting to £3,104, has been let to Mr. George Lyall, junr., of Aberdeen.

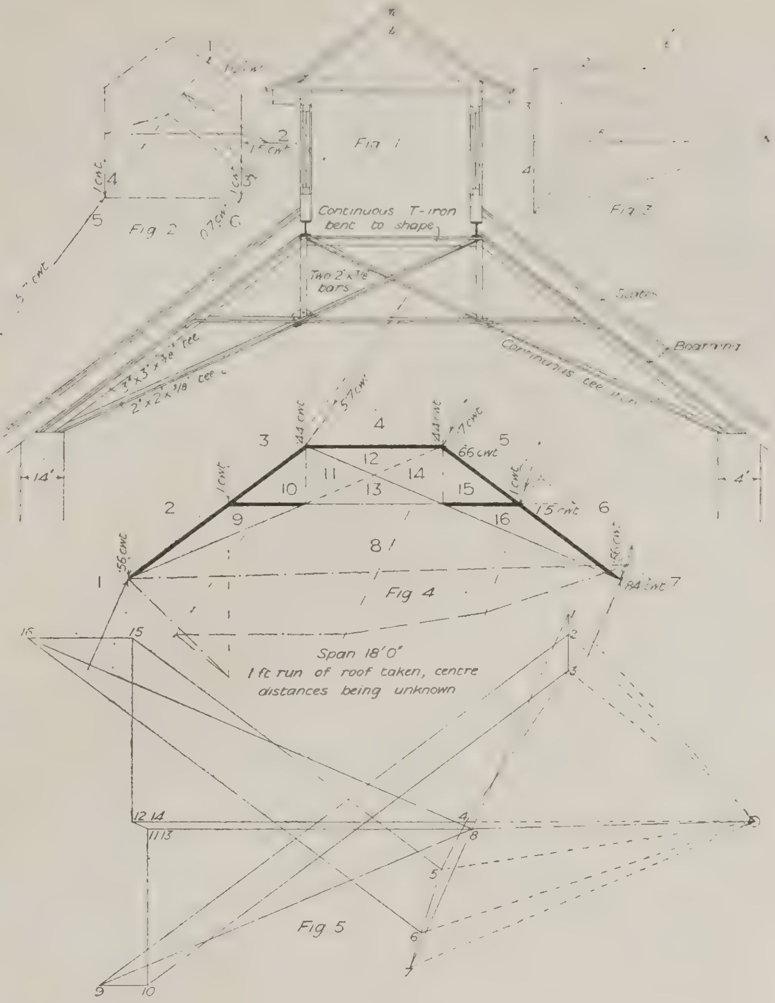
New public abattoirs for the Metropolitan Cattle Market are being erected in Caledonian Road, Islington, from the designs of Mr. Sydney Perks, F.R.I.B.A., by Messrs. Charles Dearing & Son, of Islington, at a cost of £40,000. These abattoirs will equal the best on the Continent.

Messrs. Holloway Brothers, of London, have secured the contract for erecting the nave of Hexham Abbey at the sum of £17,500. The difference between the highest and lowest tenders was about £8,000. Work is expected to be commenced shortly, and will occupy about two years.

Seven Ages of Architecture will be dealt with by Prof. F. M. Simpson, F.R.I.B.A., in a course of ten lectures at University College, on Tuesday evenings at 8 p.m., commencing on Tuesday, January 15th. The seven ages to be considered are:—(1) Ancient, (2) Greek, (3) Roman, (4) Byzantine, (5) Early Christian, (6) Medieval (Romanesque), and (7) Medieval (Gothic).

Canterbury Cathedral and Coal Smoke.—Mr. W. D. Caröe, in a letter to the "Times," says that £9,000 has been spent on the absolutely necessary repair of three of the faces of the great Angel Tower of Canterbury Cathedral, and an examination of the remaining side—the east side—has revealed the fact that a considerable expenditure will have to be incurred upon this also, as the stone is rotten behind the crust—this condition being due entirely to the action of coal smoke. An appeal is made for funds to carry out the work.

Clayton Hill Improvement.—A meeting of local governing bodies was held recently at Hassocks to consider the scheme for cutting a new road 1¼ miles long so as to avoid the steep ascents of Clayton Hill, near Brighton. The scheme is estimated to cost altogether about £13,000, and has been prepared by Mr. Clayton Botham, architect and surveyor, of Brighton. The present road will not be interfered with, but will still remain the public road to the top of the Southdowns and to the Mills at Clayton. It was stated at the meeting that Clayton Hill had stood quite long enough, and to allow such a hill to remain on a main road was both absurd and a nuisance. A resolution was passed forming a committee to go into the matter.



ROOF WITH LANTERN.

Monks Building their Own Abbey.—One of the Benedictine monks of Buckfast Abbey, Buckfastleigh, is at present at the studios of Mr. Harry Hems, Exeter, where he is being taught the art of dressing stone. The monks have started to build at Buckfast an abbey and church on the old Cistercian foundations. The work is likely to cost between £30,000 and £40,000. The dressing and pointing of the stone will be done by the monks themselves, who also have charge of the building operations, under the direction of the abbey architect, Mr. F. A. Walters, of Westminster.

Glasgow Institute of Architects.—At the last quarterly meeting of this Institute, held on December 19th, the Council's report was approved regarding a proposal to form a building fund for new premises for the Institute; also a letter of protest sent to the Corporation regarding the conditions of the Riddrie Estate competition. It was reported that the Council had had under consideration the proposed Corporation by-laws, and also the proposed Bill on similar lines for England and Scotland. The Council saw nothing in the proposed Corporation by-laws to which special objection could be taken, but it was agreed to watch the proposed Bill, and to take steps to have a clause introduced providing that it should not apply to Scotland, as the circumstances in Scotland were different from those in England. It was pointed out that the course of training in the Glasgow School of Architecture covered the whole ground of the R.I.B.A. examinations, and it was agreed to ask the R.I.B.A. to recognise the work of the school as follows:—(1) That the diploma or senior certificate of the Glasgow School of Architecture should exempt the student from the preliminary and intermediate examinations of the R.I.B.A.; and (2) that the corresponding class work done in the Glasgow School of Architecture should be accepted as "testimonies of study" for the R.I.B.A. final examination.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

The querist's name and address must always be given, not necessarily for publication.

Stress Diagram for Roof with Lantern.

BIRMINGHAM.—H. E. W. writes: "Please explain the method of finding the stresses in the roof truss shown by the accompanying drawing. I have not been able to do so owing to there being two unknown points in the stress diagram. It seems to me that the sizes of the members figured on the tracing should be sufficient."

As the distance apart of the trusses is not given, no opinion can be formed with regard to the sufficiency of the proposed scantlings, which appear to be light. The design furnished is shown in Fig. 1 and the span is assumed to be 18ft. Fig. 2 shows a diagram of the lantern taken as a rigid structure, with the view of ascertaining the reactions upon the truss. Mark the force lines, 1 for wind on roof of lantern, 2 for wind on side, 3 and 4 for weight of lantern; 5 and 6 must be left until the reciprocal diagram, Fig. 3, is commenced. Draw the force lines to scale in Fig. 3, and parallel to their direction in Fig. 1; then 5 and 6 will be contained in the line joining the extremities of 4 and 1. Mark any pole 0 in Fig. 3 and draw vectors to the junctions of the forces. Add lines in Fig. 2 for the directions of forces 5 and 6. Draw a funicular polygon across the space between the directions of all the forces in Fig. 2, the vector from the junction of two forces giving the direction across the space between the corresponding forces in Fig. 2. The closing line of the polygon, shown in stroke and double-dot line, will give the direction of the vector to fix the junction between 5 and 6 in Fig. 3, and therefore the value of the reactions 5 and 6. In this case it is rather more convenient to number the forces in Fig. 2 than to adopt the usual course of numbering the spaces. Now the reactions of the lantern may be transferred to the frame diagram Fig. 4 as external forces and combined with the other loads found in the ordinary way. The bars crossing the quadrangular space in the centre are to provide that a tension member will be there from whichever side the wind blows. With the wind on the right, as shown, the bar 11-12 13-14 will be in tension and the bar 11-13 12-14 will have no stress, these conditions being reversed when the wind blows from the other side. The stress diagram will then be constructed without difficulty as in Fig. 5.

HENRY ADAMS.

Arrangement of Trusses.

Referring to the reply to the enquiry under this head on page 298 of our issue for December 12th, Prof. Henry Adams writes: "I notice that the bolts in Fig. 5 are marked ⅜in. diameter. In the pencil original they were correctly given by me as ¾in., so that I presume my tracer copied the figures wrongly, which I regret."

Fireplaces for Burning Peat.

LEICESTER.—LOCO writes: "Please give particulars of the construction of fireplaces for burning peat as fuel."

In the labourers' cottages in Ireland peat was burnt upon open hearths raised about 4ins. above the general level of the floor. The fireplace openings are generally about 3ft. wide and not less than 18ins. deep, with hooks suspended for raising and lowering the pot in which the cooking is done. Flues for these open fireplaces should not be less than 14ins. by 14ins., and it is often found that better results are obtained by making them even 18ins. by 18ins. They are generally built straight. More modern cottages are fitted with open ranges about 2ft. high and 3ft. across. These will burn sods of turf. The latter are about the same size as standard bricks. The flue for an open range of this character should be 14ins. by 14ins. Circular fireclay flue linings are generally used in Ireland for better-class work, but for labourers' cottages rectangular flues are adopted.

Labourers' Cottages in Ireland.

LEICESTER.—LOCO writes: "What are the most suitable materials for use in construction of labourers' cottages in Ireland? What local materials are available?"

The most suitable materials for use in the construction of labourers' cottages in Ireland are (a) rubble masonry with stock brick quoins and jambs; (b) brickwork; (c) concrete—according to the district. Bricks are not easily procurable in rural districts, and even near the towns the Irish-made bricks are of a poor quality and much dearer than in England. Freight adds considerably to the cost of imported bricks. Rubble walls are generally built not less than 18ins. thick, brick walls 13½ins.—9in. work will not keep out the weather, owing to the humid atmosphere. Lime, sand and gravel are abundant. Dressed stone is seldom used, and is costly. Limestone or granite are generally used for rubble work. Roofs are usually covered with slates, either Bangor, American, or Killaloe. The last-named are inferior in quality to the Welsh or American slates. Tiles are seldom, if ever, used, as they have to be imported, and are costly. Thatch and galvanized iron have both been used in the past, but are quite unsuitable, for obvious reasons. The timber used is red or white fir—chiefly the latter. A little Portland cement is made in Ireland, but it is generally imported from England.

BIGGLESWADE.—B. M. writes: "Kindly give me an idea of the price per cubic foot of cottage building in Dublin; also are there local characteristics in the types of cottages there?"

The price per cubic foot of labourers' cottages in Ireland varies from 4d. to 5d., according to the locality and whether they are put up singly or in pairs, the cube being measured from the bottom of the foundations to a point half-way up the roof. As regards the local characteristics in the types of cottages used, the design is generally as simple as possible, both to secure economy in construction and in future up-keep. One-storey cottages are usually built with the walls three-quarters the height of the rooms, which are ceiled at the collar braces. They usually contain one living-room and two sleeping rooms, with a small scullery and sanitary accommodation. Two-storey cottages have been adopted recently containing a large living-room and kitchen on the ground floor and two bedrooms upstairs. In the better-class of cottage a separate kitchen is provided. If the living-room is used as a kitchen a scullery must be added. A water-butt should be provided for storing roof-water, as the well-water in Ireland is often very hard. The sanitary appliances should be of the simplest possible character. Something in the nature of a midden is most suitable for the agricultural population.

Buildings to Measure near South Shields.

SOUTH SHIELDS.—M. L. writes: "Please state what subjects in the district of South Shields are the best for measured drawings for the Intermediate R.I.B.A."

Crowning a hill midway between Jarrow and Hylton Castle stands Boldon Church (St. Nicholas), once a beautiful Early English church of which the peculiarly-designed tower and spire are replete with interest. This church has been restored, but the principal parts of the original building still remain. The Church of St. Paul, at Jarrow, dating from the 7th century, was founded by Benedict Biscop, and much of the original church still remains. Good Norman work is to be seen here, and the N. and E. windows are of the Decorated style. In the chancel are two elaborately carved bench ends of 15th century date. A chair called "Bede's chair," said to have been used by the Venerable Bede, is also to be seen at this church, but it is difficult to imagine how it escaped destruction when the monastery, which once existed at Jarrow, was burnt by the Danes. Some remains of St. Nicholas' Church, Bishopswearmouth, founded in A.D. 930, still remain, as well as a 13th century sedilia. Some excellent work is to be seen at Tynemouth Priory. At Newcastle-upon-Tyne are the magnificent Cathedral of St. Nicholas, The Keep, and two churches. The Keep contains some fine Norman work. St. John's and St. Andrew's churches contain good work of the Transitional Norman and Decorated periods and 15th century font covers. The church of St. Peter, Monkwearmouth, contains work of the 7th century, was founded by Benedict Biscop, and is particularly interesting as being the earliest existing stone church in the country.

H. Y. M.

Snow-Boards.

LANCS.—RUSTICUS writes: "What is the best material for snow-boards in the gutters of a house when the water-supply depends upon rain collected on the roofs? Creosoted timber is obviously out of the question!"

Ordinary fir timber will last for a good many years without creosoting if well seasoned. Oak may be used for the bearers resting in the gutter. In fixing the battens to cross-ledges, nails should be dispensed with, as even if galvanized they will probably perish; trenails are preferable. In the United States gutters and rain-water pipes are quite commonly made of Californian redwood or cypress, but these are probably not readily obtainable in this country—at any rate not in country districts.

E. G.

Coming Events.

Friday, January 4.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—Mr. A. S. Dixon, M.A., on "Architectural Education—a Suggestion."

Monday, January 7.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.—Business meeting, at 8 p.m.

LIVERPOOL ARCHITECTURAL SOCIETY.—Mr. S. D. Adshead on "Style in Architectural Draughtsmanship."

Tuesday, January 8.

INSTITUTION OF CIVIL ENGINEERS.—Mr. Francis Fox on "The Simplon Tunnel," at 8 p.m.

ARCHITECTURAL ASSOCIATION OF IRELAND.—Mr. J. H. Pentland, B.E., F.R.I.B.A., on "Electrical Installations—the 3-Phase System."

Wednesday, January 9.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Mr. James Lochead on "Flanders—Commerce and Architecture," at 8 p.m.

ARCHITECTURAL ASSOCIATION (Discussion Section).—Mr. N. D. Sheffield on "Wallpapers," at 7.30 p.m.

Thursday, January 10.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—Annual dinner.

SHEFFIELD SOCIETY OF ARCHITECTS.—Mr. H. L. Paterson, A.R.I.B.A., on "Woodwork."

Friday, January 11.

ARCHITECTURAL ASSOCIATION.—Paper by Mr. Temple Moore, F.R.I.B.A.

GLASGOW TECHNICAL COLLEGE ARCHITECTURAL CRAFTSMEN'S SOCIETY.—Annual dinner.

Monday, January 14.

SURVEYORS' INSTITUTION.—Resumed discussion on the paper by Mr. E. H. Blake on "Some Notes on Sanitary Law."

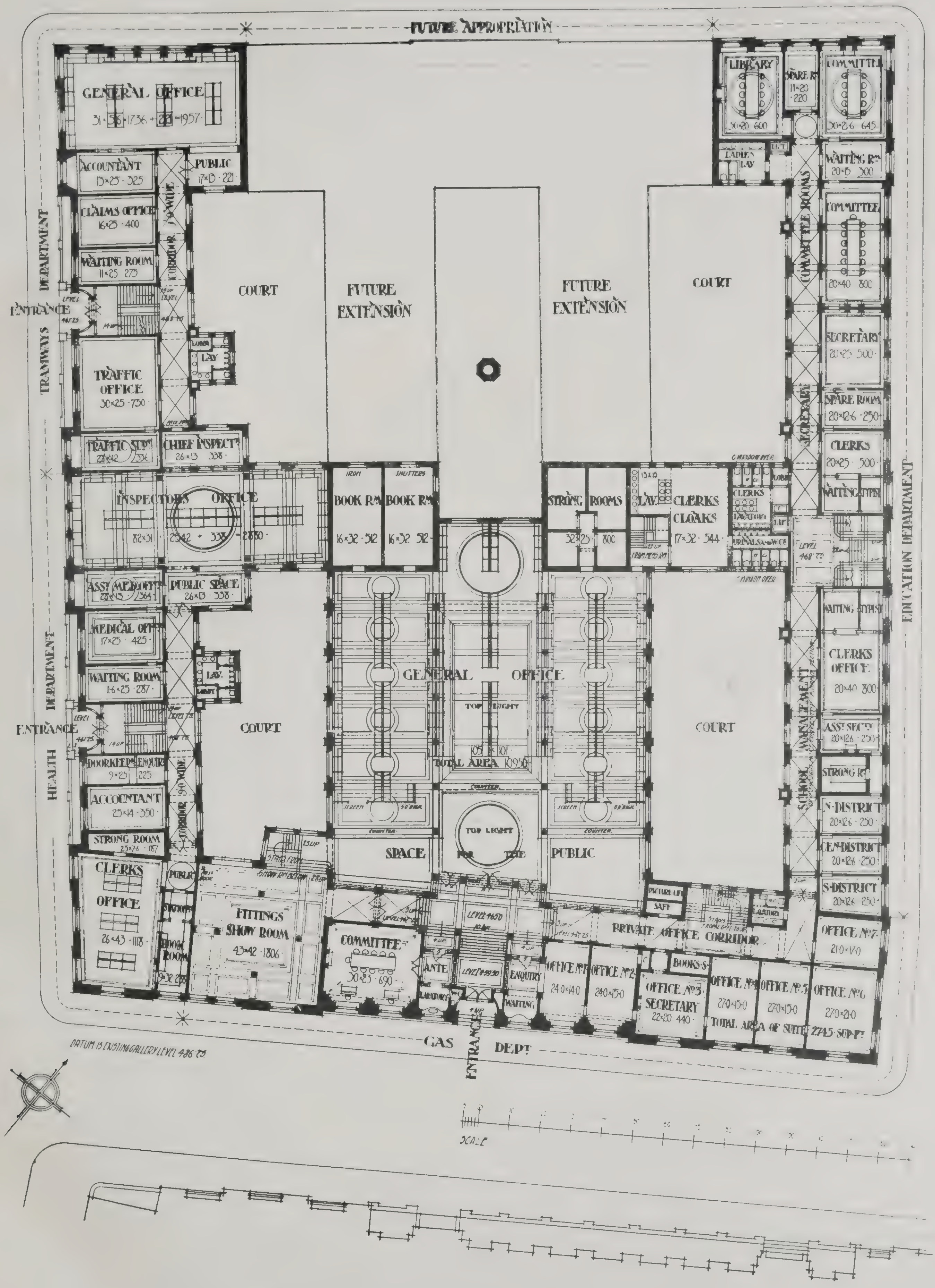
Thursday, January 17.

SOCIETY OF ARCHITECTS.—Mr. G. E. Bond on "The Practice of Architecture in our Smaller Cities and Towns," at 8 p.m.

Friday, January 18.

SOCIETY OF ARCHITECTS.—Smoking Concert, Great Eastern Hotel, at 8 p.m.

Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, January 9th, 1907.



BIRMINGHAM COUNCIL HOUSE EXTENSION: UPPER GROUND-FLOOR PLAN.

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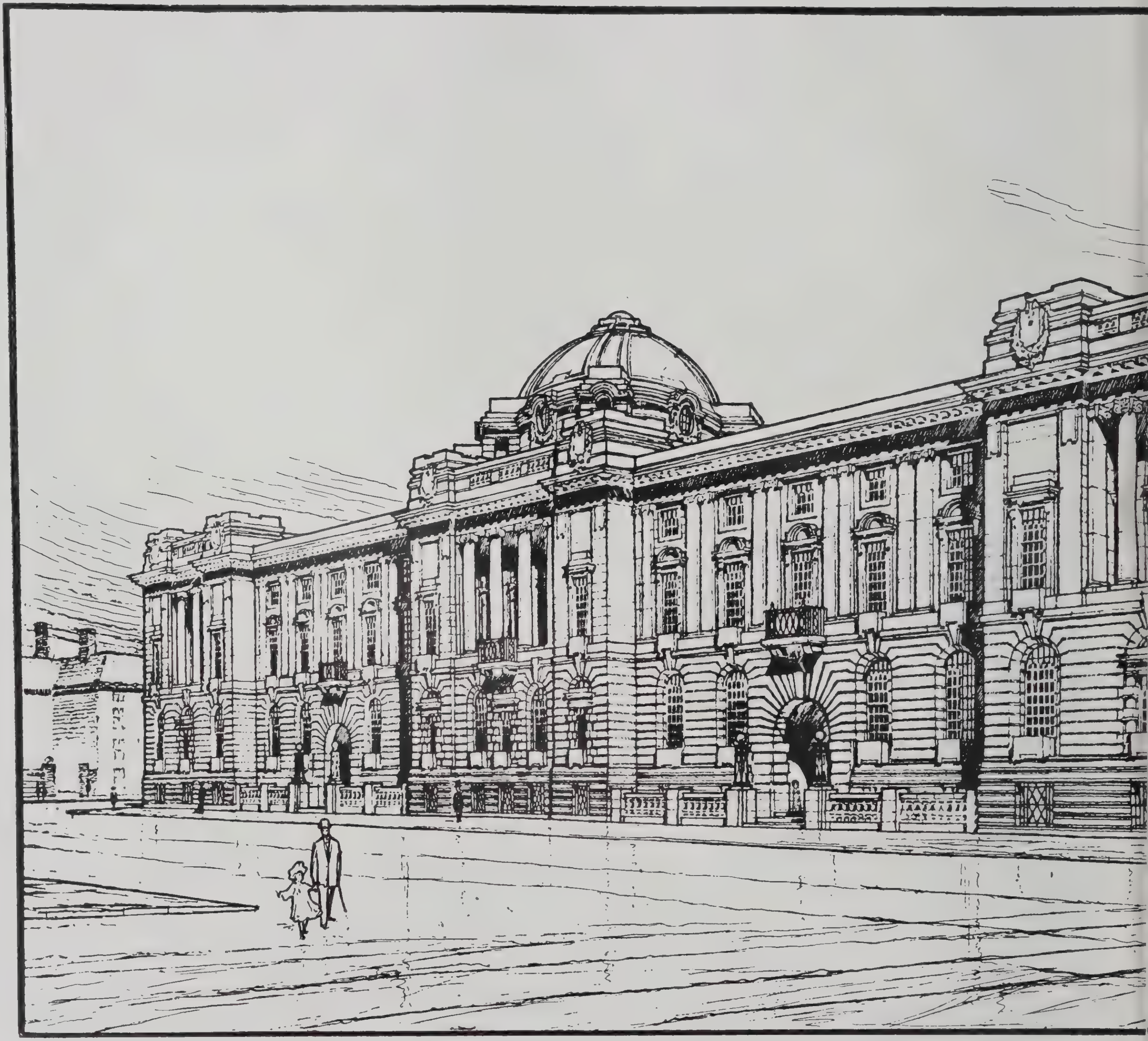
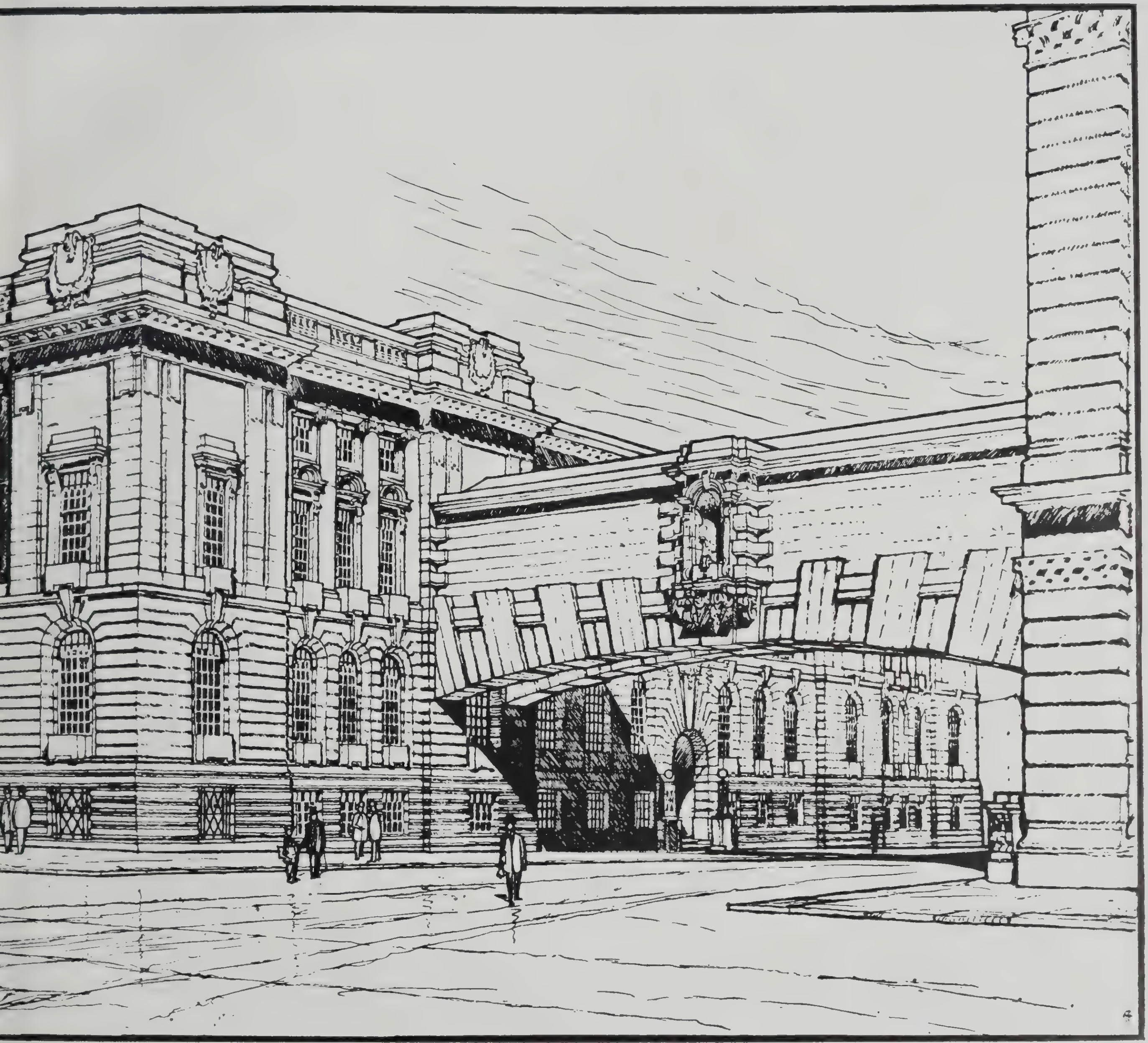


BIRMINGHAM COUNCIL HOUSE EXTENSION: SELECTED



H. V. ASHLEY AND WINTON NEWMAN, ARCHITECTS.

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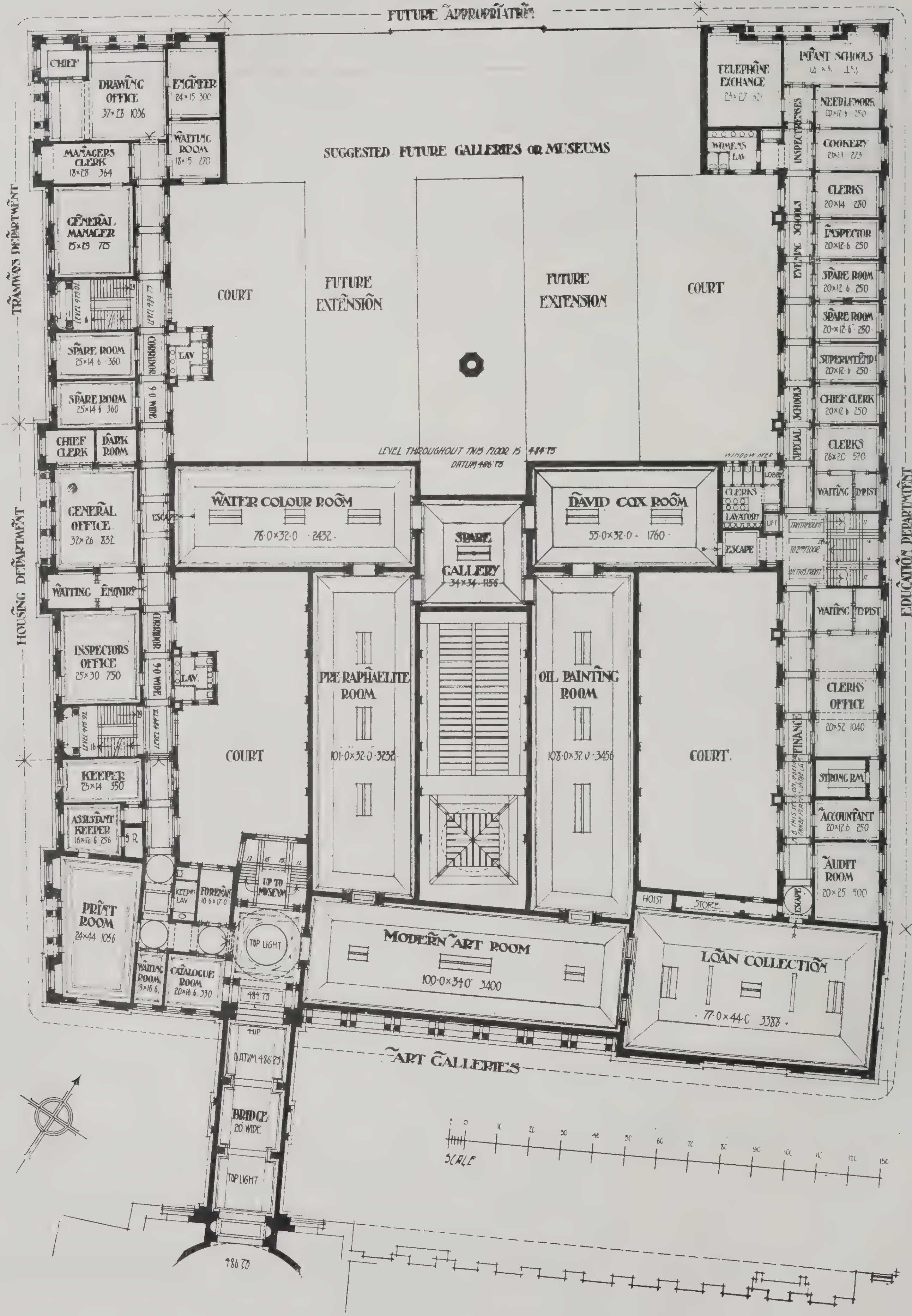

BIRMINGHAM COUNCIL HOUSE EXTENSION: FIRST-FLOOR PLAN.

January 9, 1907.

Volume 25, No 622

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The Philosophy of Architecture. IT were advisable that more attention be paid by both practitioner and student to the study of what may be termed the philosophical aspect of architectural design. As has been often (and truly) said, the modern architect is a self-conscious artist. This fact has an important bearing upon the æsthetics of design, because it means that the methods by which the old architect was trained do not apply now. Our education is still based upon the foundational belief that a knowledge of architectural design is to be obtained merely by practice and patient study of traditional methods. It is true this served for the Middle Ages—then the architect served a long apprenticeship before he was held to be competent to undertake the design of buildings, but for us it is impossible, even if the student could spare the time, because we have lost the associations of craftsmen and their handing-on of tradition. The old designer worked by instinct, but the architect nowadays does not design rightly by instinct. He requires some more reasoned foundation for service to guide him in rejecting forms which are bad. The modern architect, in order to produce his art, has to consciously apply his science in construction to the fulfilment of ideal needs. He is an engineer, and yet more than an engineer. It is here that the study of the philosophy of architecture becomes most important. There have been a good many writers on the subject, more especially German professors with no practical experience. Of course, our own foremost examples in England are Ruskin and William Morris. Of recent years we have seen books by Yrjo Hirn and Prof. Baldwin Brown, and Mr. T. G. Jackson has lately written a book on "Reason in Architecture," but in our opinion the most satisfactory theory is that of Leopold Eidlitz, an American architect, whose book is entitled "The Nature and Function of Art, more especially of Architecture." All these writers call attention to the same fundamental idea that architectural design should be expressive of the function which is to be served. Ruskin calls for truth, Morris requires architecture to be organic, Mr. Jackson asks for it to be reasoned. Perhaps the most modern term to use would be that it should be evolutionary, not in the sense of historical sequence, but in so far as accurate fitting of every need and responding to every stimulus. Ruskin's ideal of truth follows, for the construction cannot be disguised or it becomes illogical. Eidlitz particularly emphasises the fact that one of the functions which has to be expressed is that of idealism. For instance, a church requires the use of the arts of painting, sculpture, &c., to a much greater extent in order to convey spiritual ideals. It has been customary by many unphilosophical thinkers to call the factory utilitarian, but the word is a snare, because the ideal elements are just as useful and necessary to a church as structural efficiency for business purposes are to the factory. The architectural treatment of both has to be phrased to fit the special conditions, and while the architectural treatment of the more ideal structure is naturally higher up in the scale than the treatment of the commercial structure, yet the one is as much architecture as the other. The student and the practising architect, if they studied such points as these, would begin to realise that forms which may appear to be pretty in some circumstances would be foolishly out of place in others. They would know then that "taste" is not to be trusted, but reason alone, and they would know what to reject, what to modify, and what to add, in order to produce the architectural creation perfect for its purpose.

New, True, or Neither

In Ward, Lock's "Guide to Glasgow" the following appears:—"The new municipal buildings fill the whole of the eastern side of the square. The structure is generally four storeys in height, the altitude of the walls being as a rule 75ft." This is really very remarkable. The guide-book author does not actually say so, but we are compelled to infer that, although the structure is generally four storeys high, one can never be sure. Glasgow may wake up one morning and find the municipal buildings gone up three storeys during the night, and the walls, which "as a rule" are 75ft., may be found to be hardly above first-floor level. But perhaps the guide-book author doesn't mean this. Perhaps it is only another case of bad grammar.

* * *

The discussion which has been going on in the "Times" about surveyors' evidence at arbitrations obviously calls to mind the late Commissioner Kerr's facetious division of liars into three classes: liars, —— liars, and expert witnesses. Of the particular merits of the discussion, this is not the place to speak, but the writer cannot pass unnoticed the humour of the situation. By averring that "the expert surveyor makes his opinions fit his instructions" "Anti-Humbug" has stirred up one of the fraternity with a vengeance, and the latter belabours him for his "wicked, vulgar libel" and "the foul charges made against an honourable body of which I am proud, sir, to be a member." (Cheers.) The proud member's letter appears on January 1st. That is important. Let it be marked down—a good resolution. Other surveyors please note.

* * *

Another horror is upon us. "Drink, puppy, drink," is to be extended to the human species: for that is really what is conveyed by the proposal "which has met with unqualified support" to erect in every town of the United Kingdom a mural drinking fountain to the memory of the late Sir Wilfrid Lawson.

* * *

Architects never know how their darling creations will commend themselves to the great heart of the British public. Not so long ago there was put up a very large building all glorious without, glistening with faïence of every brilliant hue. A poet passing by with an architectural friend was asked what he thought of it. He sighed a little, cast up his eyes, and whispered, "Is it an overground convenience for giants?"

The poetry of colour in architecture will never hold sway over the hearts of men while poets are allowed to think and speak such blasphemies. (It is really a bank, you know.)

* * *

There is a great tameness about the architectural criticism of the present day. We are reminded of this by the extensions that are about to be made to Blackfriars Bridge. When Mr. Joseph Cubitt designed the present bridge in 1864, the "Quarterly Review" was not mealy-mouthed on the subject. The new design was dubbed a "wonder of artistic depravity" and "evidence of depraved imbecility." There is richness in the tone of this which one rather misses now, though in all conscience there are plenty of perpetrations which deserve equally wild words.

* * *

Talking of bridges, when is the L.C.C. going to finish Vauxhall Bridge? There was a talk of pylons at the ends surmounted by emblematic figures, but this project seems to have gone to sleep. It has been whispered that the figures are to be cast in lead, a metal peculiarly appropriate to a position where fine detail would be altogether wasted. It is to be hoped that the L.C.C. will have the courage of their convictions and go ahead with this work. The bridge is altogether too good to be left incomplete.

* * *

In the next column there is an account of the quick building which has been going on at Messrs. Kynoch's soap works near Birmingham, and at the new office building which Messrs. Cubitt & Co. are now completing next the Mansion House. Both are very creditable examples of speed, but, after all, what are they in comparison with that wonderful feat recorded by a man who saw a building in course of erection as he went to the office in the morning, and on his way home in the evening found the tenants being turned out for back rent!

* * *

"The American Architect" has been asked to "comment indulgently" on the price which will have to be paid by those members of the American Institute of Architects who attend the forthcoming banquet at Washington when Sir Aston Webb will be presented with the American Institute's first Gold Medal. Without debating the question whether a man who spends fifteen dollars on a meal is indulging or over-indulging, the "American Architect" points out that if "banquets" are to be the rule the Institute will soon cease to be a democratic body, simply because it has become an oligarchial one, for only those who can afford to waste money needlessly will find themselves attracted to these occasions, "and money is not always the equivalent of worth." However this may be, there can be no doubt that if architects are ever seized with the fever of extensive dining, after the manner of the City Companies, the profession's digestion will be utterly ruined, and assistants will have a worse time than ever when a dyspeptic principal begins to make a few observations on office ethics.

THE LOOKER-ON.

QUICK BUILDING.

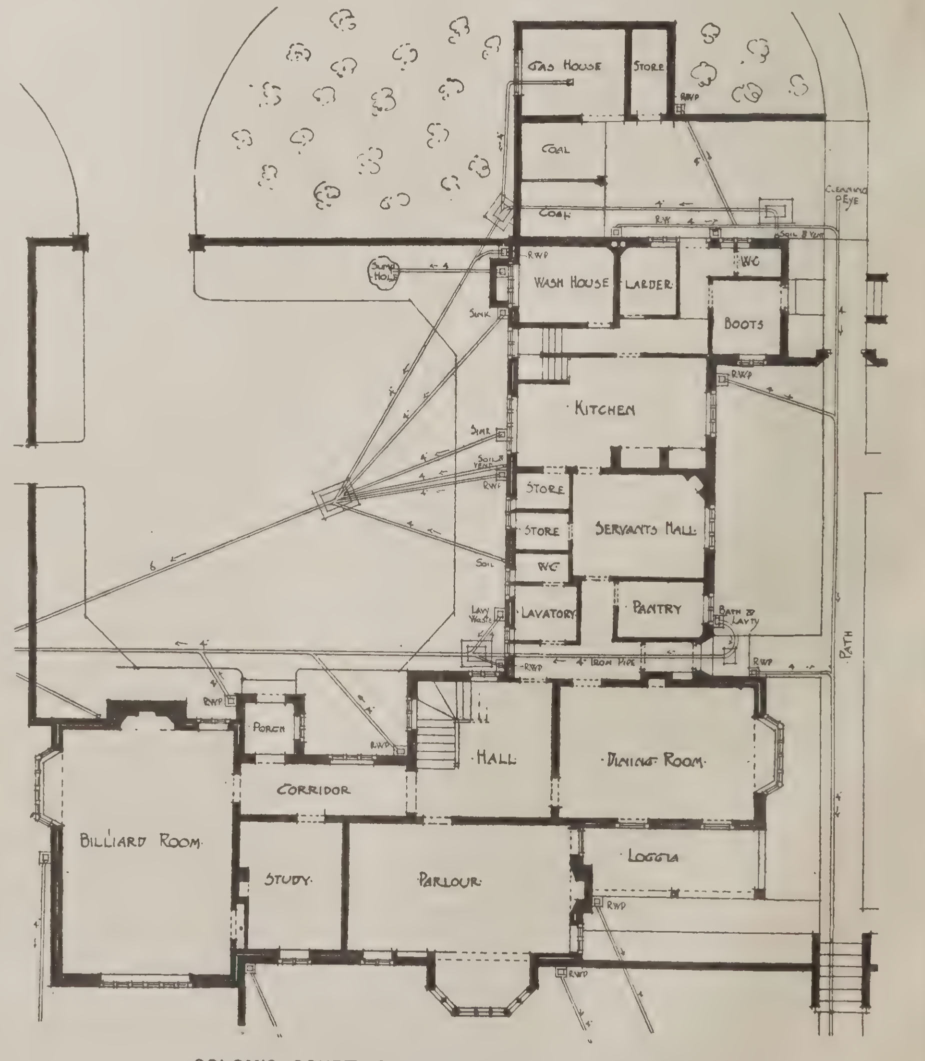
Attention has been drawn in the daily press to some recent examples of quick building. Messrs. Kynoch's new soap works at Witton, Birmingham, are first mentioned. After the site had been inspected, the firm's own architects and engineer got to work at once, and a large staff of workmen was engaged. Twenty-four hours after the scheme was mooted the work was in progress, and continued night and day, with the result that the new factory, started on November 19th, was completed on December 6th. The building covers seven-tenths of an acre, and is in parts three storeys high.

The publicity given to this feat has not been allowed to pass without other claims being put forward. Thus, Messrs. W. Cubitt & Co. have a word to say about the large block of offices which they are now completing in Lombard Street, next the Mansion House, from designs by Messrs. Dunn and Watson. This building (shown on page 343 of THE BUILDERS' JOURNAL for December 26th last) is carried out in a very substantial manner, fitted throughout in a most decorative and rich style, the façade having 3,000 tons of worked Portland stone in it, and the carving alone having cost £1,600. Messrs. Cubitt write:—"The architects' estimate of the time required to complete this building in the ordinary way was two years, but the time actually occupied, working day and night, will be exactly 251 working days since the site was cleared. . . . We submit, therefore, although Messrs. Kynoch only occupied three weeks in building their factory, and we have occupied over forty weeks in building these offices, that, taking into account the difficulty and the work entailed in the one as against the simple and straightforward work required in the other case, our building has more claim to the title of 'world's record' than theirs."

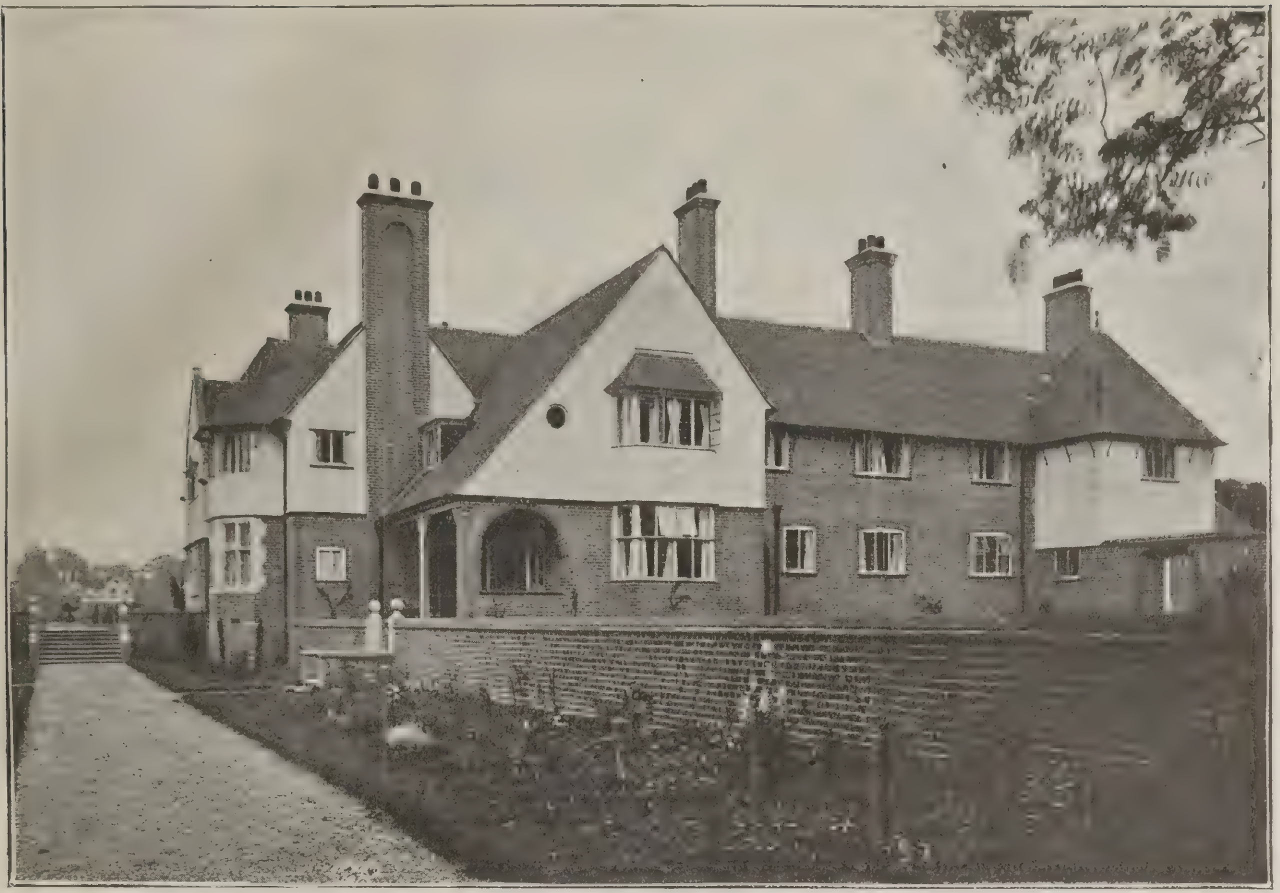
SOLOM'S COURT, SURREY.

This house has been erected for Mr. H. K. Rutherford. It is built of grey bricks with red-brick dressings, rough-cast on portions of the fronts, and red hand-made tiles on the roofs. In conjunction with the house there is an interesting garden scheme. On the east are a lawn and flower garden, with grass paths running through a beech wood which closes this side; on the south side is a terrace with a tennis lawn below; and on the west are a flower garden and a kitchen garden. The entrance court is on the north front. Mr. E. Guy Dawber, F.R.I.B.A., of Buckingham Street, Strand, W.C., was the architect.

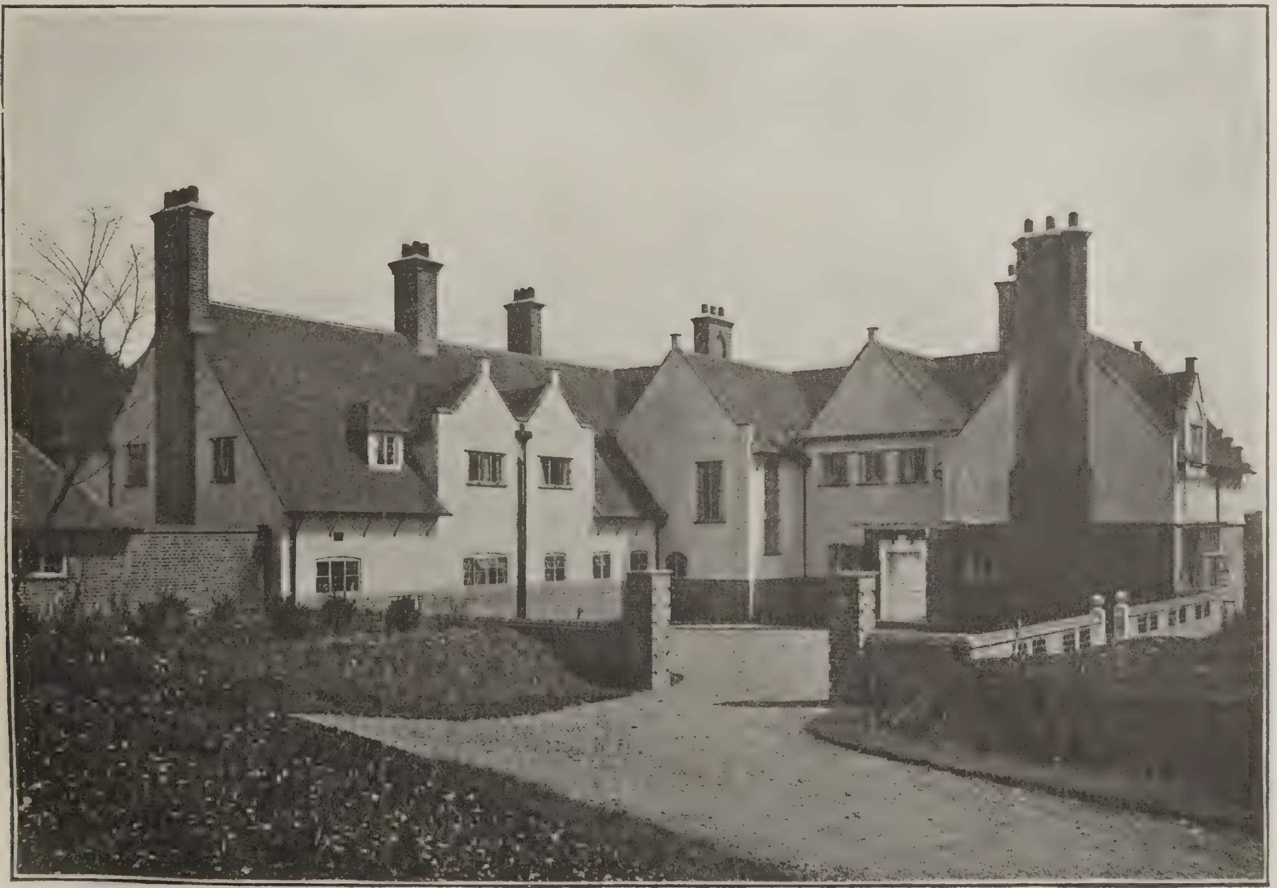
A Stone Viaduct is proposed to be erected by the Great Western Railway Co. to carry their Cornish line across the upper end of Victoria Park, Plymouth, in substitution of the present wooden structure.



SOLOM'S COURT, SURREY: GROUND FLOOR PLAN.
E. GUY DAWBER, F.R.I.B.A., ARCHITECT.



View from Garden.



Entrance Court.

Photos W. E. Gray.

SOLOM'S COURT SURREY. E. GUY DAWBER, F.R.I.B.A., ARCHITECT.

Notes on Competitions

The Henry Saxon Snell Prize Essay.

The subject given this year for the above was "Suggestions for Improvements in Sanitary Appliances for use in Workmen's Dwellings and Labourers' Cottages, under the varying conditions of water supply and drainage usually obtaining in towns and villages." Nine essays were sent in, and brought under the consideration of the council of the Royal Sanitary Institute. Acting upon the advice of the adjudicators appointed, the council have decided to divide the prize between two essayists, whose essays are about equal in merit, and they have awarded to Mr. John R. Preston, M.R.S.I., Lancaster, writing under the motto of "John of Gaunt," and to Mr. E. H. Parkinson, architect and surveyor, Bradford, writing under the motto of "Spero Meliora," each the sum of £25 and a bronze medal of the Institute.

The "Compound Competition."

Our esteemed contemporary the "American Architect," we note, is quite zealous in its advocacy of the "compound competition," and finds "distinctly a satisfaction" in Mr. Collcutt's recent presidential address to the Institute, wherein he says "it is to the interest of the public that a competition should be instituted for every proposed public building of importance." Our contemporary goes on to say:—"The compound competition gives, so far as we are able to perceive, the only reasonably certain means of discovering economically the best solution which any architect is able to provide, and this is a matter of great consequence, for it is not satisfactory that the public shall by direct selection be furnished with a building that is 'good enough' or which 'will do,' when by a different procedure it can secure the best which circumstances admit. In the next place the skeleton requirements of the open competition impose on the contestants a minimum of expenditure, while the cost imposed on those who have the luck to take part in the second competition is somewhat less than the cost has been hitherto in the ordinary 'limited' competition. . . . Possibly it is not for the interest of the elders of the profession, the 'leading architects,' the men who have 'arrived,' that the 'compound' or any other—even the most strictly limited—form of competition should be adopted, since in the case of direct selection there is obviously the greater chance that the promoter will select from the few men who are popularly known as being at the top—to the manifest personal advantage of such leaders. It is not strange that the ardent advocates of the direct-selection method should be found amongst the few at the top rather than be discernible in the ranks where the majority of the practitioners are to be found. . . . It is disappointing for one who has struggled to the top to find that he must keep on struggling and not be able to take his ease and pick and choose in a lordly way. No doubt a successful architect who has entered a competition for a public building (which he secretly believes ought to have come to him because of his reputation) must feel intense chagrin at finding the award go to an unknown man of half his years. But that is the law of life everywhere. The assumption that the best work is invariably done to private order or after direct selection is not borne out by the facts. . . ."

Wandsworth Infirmary.

At last week's meeting of the Wandsworth Guardians consideration was given to the question of appointing an assessor in connection with the competitive designs which it is proposed to invite for a new infirmary at Wandsworth. Several of the guardians urged that the scheme should be postponed, but the majority decided that it should go forward, and the matter of designs was referred to a committee.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
Jan. 12	LAY-OUT OF RIDDRIE ESTATE, GLASGOW.—Premiums of £75, £50 and £25. Particulars from A. W. Myles, town clerk, City Chambers, Glasgow. No deposit.
Jan. 19	LIBRARY AT PLYMOUTH.—Premiums £50, £30 and £20. MUSEUM AND ART GALLERY AT PLYMOUTH. Premiums £25, £20 and £10. Limited to local architects. Particulars from Borough Librarian, Plymouth.
Jan. 19	COUNCIL SCHOOL AT GORTON—Limited competition. Applications by this date to W. A. Clegg, Education Office, Town Hall, Gorton, Manchester.
Jan. 31	TWO BRANCH LIBRARIES AT SUNDERLAND.—Limited to local architects. Premiums £20 and £10 for each library. Particulars from John W. Moncur, borough engineer, Town Hall, Sunderland.
Feb. 1	CHILDREN'S HOSPITAL AT SUNDERLAND.—Premiums of £100, £50 and £25. Particulars from T. Robinson, secretary, Infirmary Offices, Bank Buildings, Sunderland. Deposit £1 1s.
Feb. 6	FEVER HOSPITAL AT GALWAY.—Premium £25. Particulars from R. F. Mullery, clerk to the Board of Guardians, Galway.
Feb. 16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
March 3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25. Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford. Yorks. Deposit 10s. 6d.
March 15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham.

OUR COMPETITION.

To-morrow, January 10th, is the last day for sending in suggestions for increasing the circulation of THE BUILDERS' JOURNAL. As announced in former issues, we offer a prize of five guineas for the best suggestion as to how we can increase our circulation. The feasibility of the suggestions will be considered by the editors, whose judgment will be final. We reserve the right to adopt any of the suggestions which we receive, whether they are awarded the prize or not. Suggestions should all be addressed to the Editors of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., and the envelopes marked "Circulation." The result of the competition will be given in our issue for January 16th.

The Nottingham Albert Hall is proposed to be rebuilt at a cost of £25,000.

Notes and News

The Widening of Blackfriars Bridge is to be completed within three years.

The Hunslet Engine Co., Ltd., of Leeds, have appointed as their sole London representatives Messrs. J. E. Lawler & Muirhead, of 39, Lime Street, E.C.

An attractive Calendar for 1907 has just been issued by Messrs. Arthur L. Gibson & Co., of 19, 20 and 21, Tower Street, Upper St. Martin's Lane, London, W.C.

"The Office Tower."—A 46-storey building is to be erected in Madison Square, New York, for the Metropolitan Life Insurance Co. It will be 657½ft. above pavement level, and is estimated to cost £600,000.

New Premises for Messrs. Debenham & Freebody, in Wigmore Street, W., are being completed. Messrs. Wallace and Gibson are the architects. The façades are of Doulton's Carrara ware, and marble and bronze will be extensively employed for decoration.

A Great Newcastle Improvement.—In the coming session of Parliament the Corporation of Newcastle-on-Tyne will seek powers to borrow £633,000 for street works. More than £400,000 is to be spent on one large scheme to be carried out upon a site right in the heart of the city.

The Epsom Parish Church Enlargement Scheme was approved last week at a meeting of parishioners. The chancel and the two eastern bays of the new church are to be built first, and an additional third bay proceeded with if funds permit. Messrs. Nicholson and Corlette are the architects.

Cardiff's Huge New Dock will be completed this year. It is 2,250ft. long, 800ft. wide, and 50ft. from coping to bottom. The work of construction was begun in June, 1898, by Messrs. Topham, Jones & Railton. The site was reclaimed from the sea by constructing an embankment 7,700ft. in length.

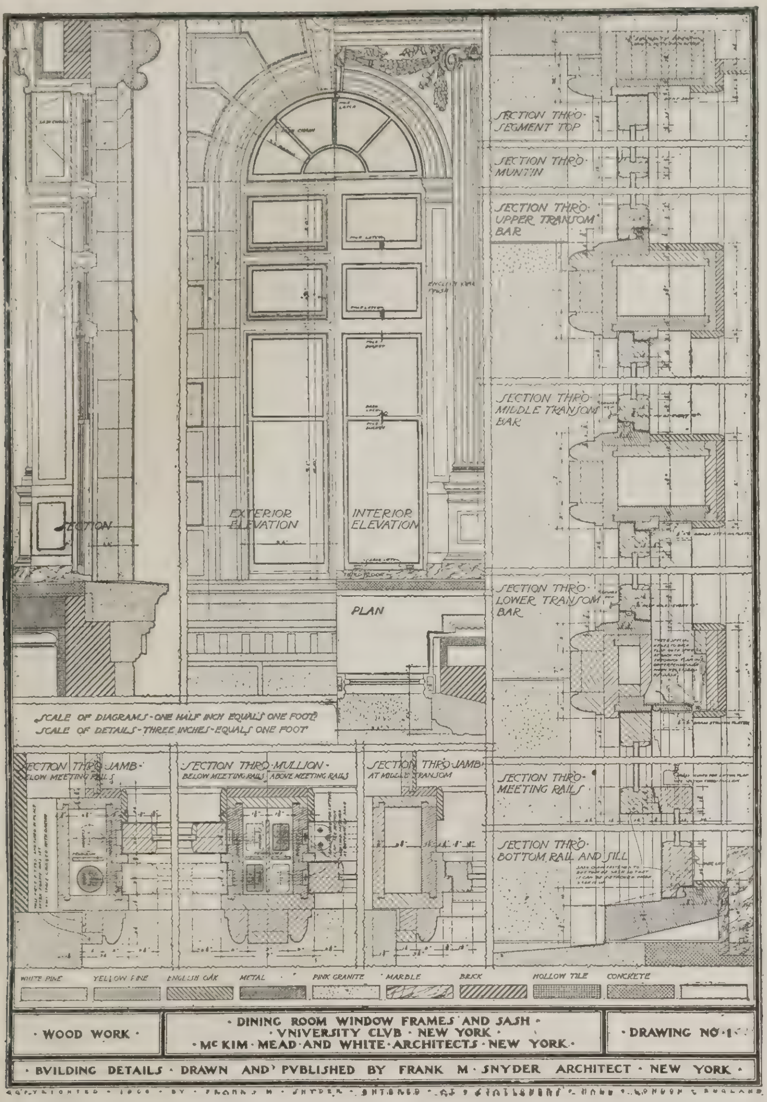
Bigger Backyards for Manchester.—The Improvement Committee of the Manchester City Council have been for some time engaged in the task of revising the building by-laws. One important departure is the increase of the backyard space from 150 to 200 sq. ft. minimum, and in conjunction with this another new clause will enact a total area of 200 sq. yds. for each house, which will reduce the number of houses which may be put upon an acre of land from 51 to 24.

A Block of Offices seven storeys high is to be erected on the site of Nos. 252, 254, and 256, Vauxhall Bridge Road—Victoria Street end—for the Central London Estates, Ltd. The contract has been signed with Mr. Charles Gray, of Shepherd's Bush, and the work is to be pushed forward with all speed The elevation will be carried out in red bricks with grey terra-cotta dressings from the Hathern Station Co.'s works. The architects are Messrs. Palgrave & Co.

Obituary

Mr. George Moir, builder and contractor, Sunderland, died recently.

Mr. Jonathan Gerrard, head of the firm of Messrs. J. Gerrard & Sons, builders and contractors, Swinton, Manchester, died on December 28th.


SECTION THRO SEGMENT TOP
SECTION THRO MUNTIN
SECTION THRO UPPER TRANSOM BAR
SECTION THRO MIDDLE TRANSOM BAR
SECTION
EXTERIOR ELEVATION
INTERIOR ELEVATION
SECTION THRO LOWER TRANSOM BAR
PLAN
SCALE OF DIAGRAMS - ONE HALF INCH EQUALS ONE FOOT
SCALE OF DETAILS - THREE INCHES - EQUALS ONE FOOT
SECTION THRO JAMB BELOW MEETING RAILS
SECTION THRO MULLION BELOW MEETING RAILS ABOVE MEETING RAILS
SECTION THRO JAMB AT MIDDLE TRANSOM
SECTION THRO MEETING RAILS
SECTION THRO BOTTOM RAIL AND SILL
WHITE PINE
YELLOW PINE
ENGLISH OAK
METAL
PINK GRANITE
MARBLE
BRICK
HOLLOW TILE
CONCRETE
· WOOD WORK ·
· DINING ROOM WINDOW FRAMES AND SASH ·
· VNIVERSITY CLVB · NEW YORK ·
· Mc KIM · MEAD · AND WHITE · ARCHITECTS · NEW YORK ·
· DRAWING NO · 1 ·
· BVILDING DETAILS · DRAWN AND PVBLISHED BY FRANK M · SNYDER ARCHITECT · NEW YORK ·

Views and Reviews.

Working Drawings.

This publication consists of ten drawings made from the architects' working drawings of executed work, verified with the work as executed, and reproduced to a large scale so as to be easily and clearly interpreted. Mr. Snyder is a master-draughtsman, and we have seldom seen drawings got up in so admirable a style. We reproduce one of the plates in the book, of course to a very small scale, but it is sufficient to show the character of these drawings. They represent the work of some of the most eminent American architects, and are bound to be of the greatest service to any purchaser, while the general concensus of American opinion suggests that they will add greatly to the increasing excellence of office draughtsmanship in that country, where, as a rule, working drawings are prepared in a much superior manner to here. The ten plates in the book have been prepared with the utmost care to ensure accuracy. They are drawn to scale, the diagrams being ½in. to the foot, and the details 3ins. to the foot (one-quarter full size); and in addition the principal dimensions have been figured. The different kinds of materials are clearly indicated, as shown by the reproduction on this page. Ironmongery and other accessories are also carefully shown. The plates measure 16ins. by 22ins., and are well bound in a neat dark-green cover. Part I. of the series consists of joinery details, showing sliding, pivoted, swinging and casement sashes, box-head windows, double and single-acting doors, with wood, marble and Keene's cement trim.

Plates 1 and 2 show dining and bedroom window frames and sashes in the University Club, New York, of which Messrs. McKim, Mead and White are the architects; plate 3 shows window frames and sashes in the United States Immigrant Station, New York, of which Messrs. Bowing and Tiltman are the architects; plates 4 and 5 entrance doors and window frames and sashes at the Union County Court House, Elizabeth, New Jersey, of which Messrs. Ackerman and Ross are the architects; plate 6 interior doors, frames and joinery finishing at the Carnegie Library, Atlanta, Georgia, of which Messrs. Ackerman and Ross are also the architects; plates 7 and 8 interior doors, frames and finishings and window frames and sashes at the Columbus Public Library, Columbus, Ohio (Mr. Albert Randolph Ross, architect); plate 9 casement doors, sashes and frames at Mrs. Dow's school, Briarcliff Manor, New York (Mr. H. Van Buren Magonigle, architect); plate 10 window frames and sash door frames and doors at the Port Jervis Public Library, Port Jervis, New York (Messrs. Ackerman and Ross, architects).

These working drawings by Mr. Snyder should be welcome. They give just the sort of information a practising architect requires, and they are of inestimable service to the student. The price is very moderate, considering the excellent style in which the plates are produced.

"Building Details. Part I." Ten Drawings, by Frank M. Snyder, architect, New York. London: Technical Journals, Ltd., Great New Street, E.C. price 6s. 6d. nett, post free.

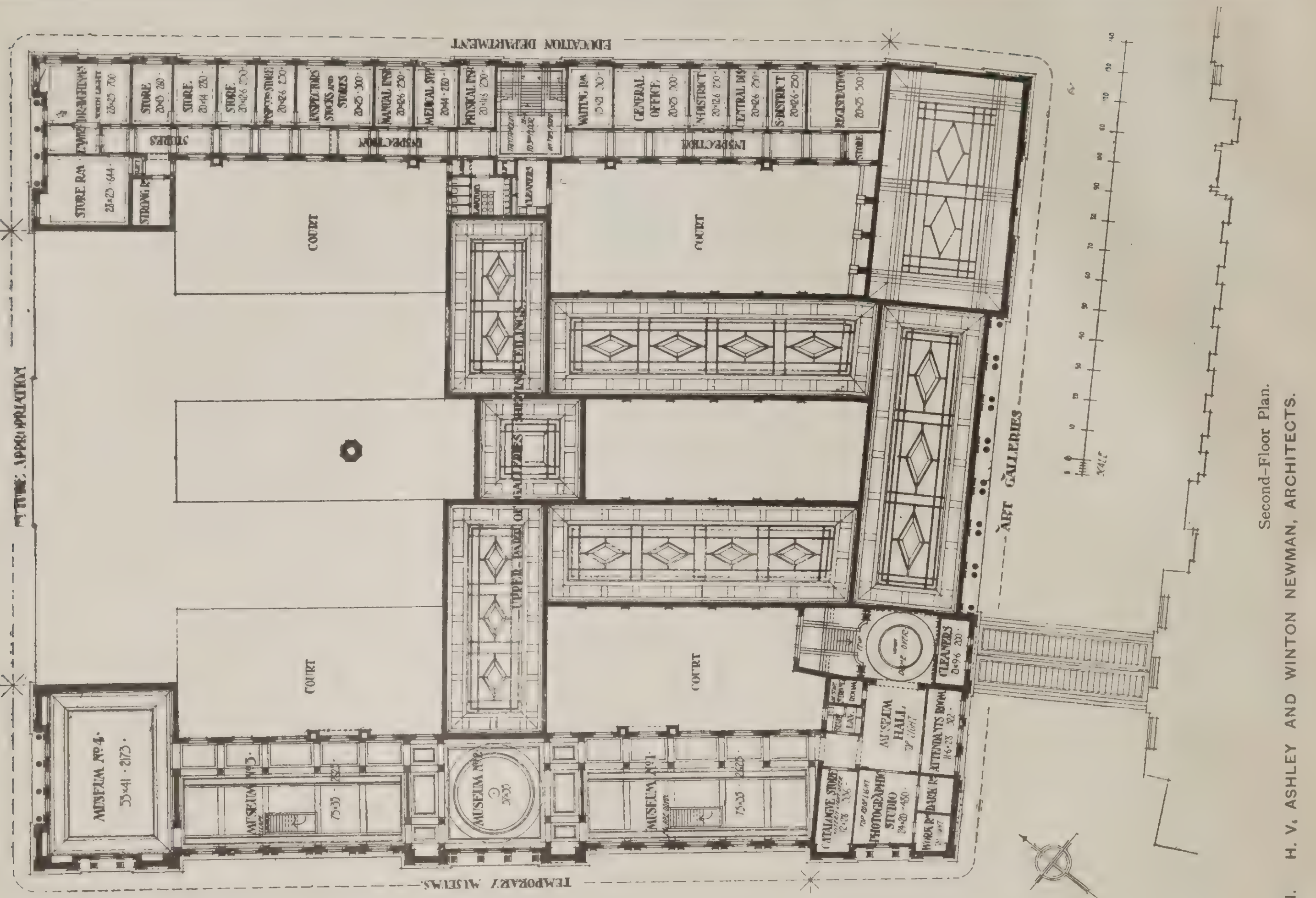
A Standard Book on Carpentry.

A few years ago Mr. Ellis published his "Modern Practical Joinery" and we are glad to see he has now followed with this book on carpentry. Mr. Ellis is a thorough master of his subject, and this book is as excellent as was his book on joinery. There is a tendency for joiners when dealing with carpentry to introduce too many refinements for economy and thorough serviceableness. In carpentry to a great extent one is dealing with rough timbers, so that refinements in jointing, such as one sees in joinery, are not possible. To a great extent Mr. Ellis is free from the defect indicated, but he occasionally tends to a joiner's way of looking at things. He says in his preface: "The perusal of the principal English books revealed the fact that, with few exceptions, they had been written, not by carpenters, but by architects, engineers and surveyors, and, in consequence, the subject had obviously suffered from the absence of that intimate knowledge which experience in the trade alone could give." This is undoubtedly true, and it is a good reason why Mr. Ellis's book should have been added to the many there are on the subject. The book is thoroughly comprehensive, for after an introductory chapter on "Tools" it deals with joints and fastenings, beams and trusses, partitions, floors, roofs, scaffolding, staging and gantries, temporary stages or spectators' stands, centres and centering, timbering of excavations and tunnels, shoring and underpinning, coffer dams and caissons, timber work in foundations, timber bridges, stages, piers, jetties and wharves, half-timbered work, timber-frame buildings, gates, principles of trussing and framing, and causes of failure in structures. Finally, Mr. Ellis devotes several chapters to the discussion of the properties of timbers, effects of loads upon beams, and methods of calculating sizes, with notes on timber and descriptions of woods used, accompanied by tables of roof scantlings. There are also a chapter on the carpenter's steel square and its uses, and a glossary of technical terms and phrases connected with carpentry. Throughout the book are dispersed many illustrations of ancient examples of noteworthy carpentry, such as old Gothic roofs. This is an excellent feature. In the chapter on scaffolding, photographs are included of large and important examples of scaffolding which illustrate the work far better than drawings could, and the same means is adopted to illustrate other parts of the book.

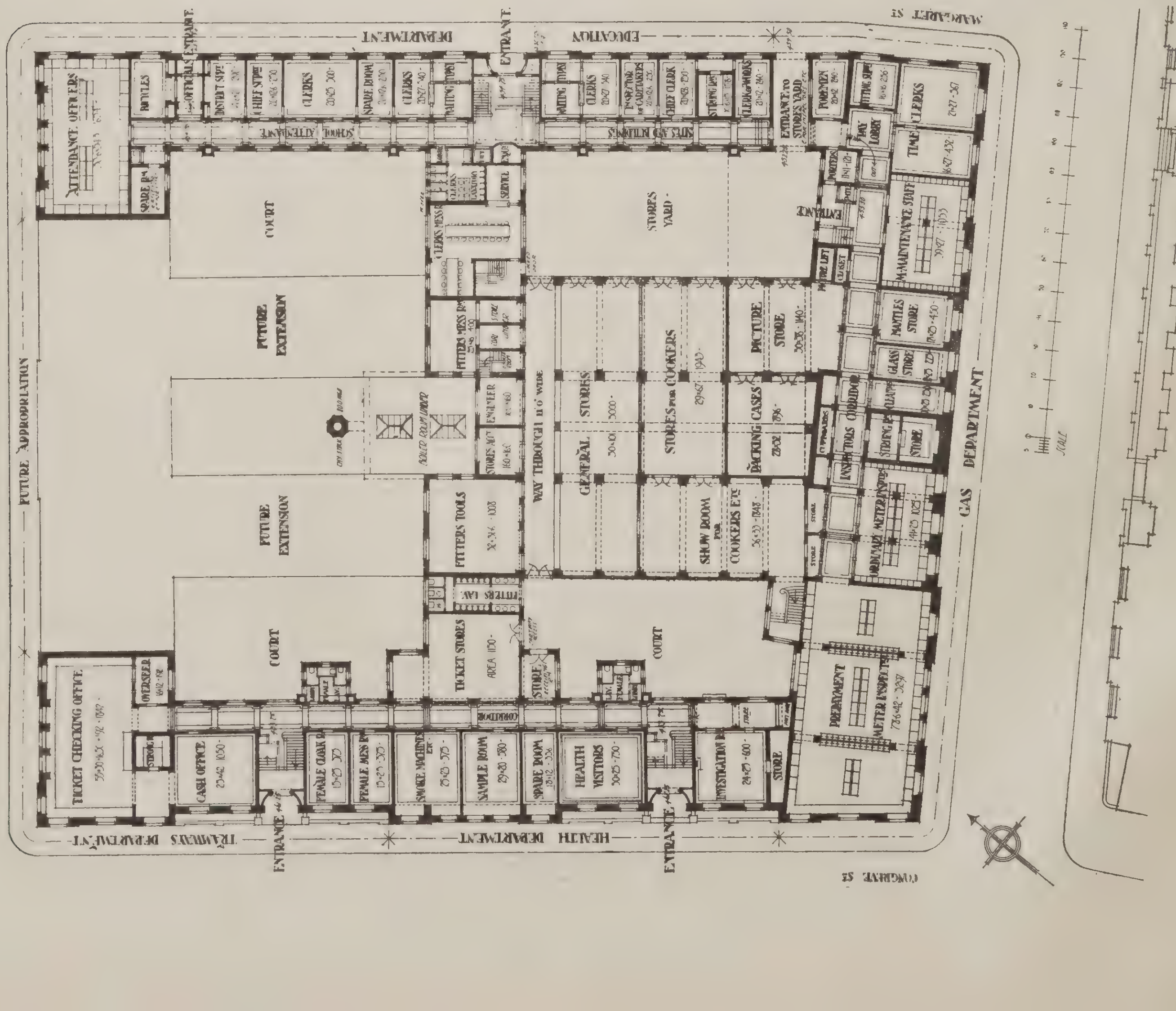
We can hardly expect Mr. Ellis to be able to deal with the theoretical side quite so thoroughly as the practical, and we feel that the portion of the book dealing with calculations for the strength of timber beams and other parts of construction is very inadequate. A good deal of information has been provided on the strength of timber in recent investigations in America, and no treatment can be thorough without mention of these.

The book is one which should be in every architectural library of any pretension, and for students who desire to pay special attention to this branch of building construction it should be all-sufficient.

"Modern Practical Carpentry," by George Ellis. London: B. T. Batsford, price 12s. 6d. nett.



Second-Floor Plan.



Lower Ground-Floor Plan.

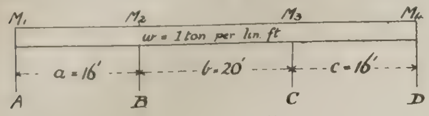
BIRMINGHAM COUNCIL HOUSE EXTENSION: SELECTED DESIGN. H. V. ASHLEY AND WINTON NEWMAN, ARCHITECTS.

Correspondence.

Bending Moments on Continuous Girder.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—In reply to Prof. Henry Adams's desire, expressed in your issue of December 12th, to see the graphic diagrams regarding the above, I herewith give them. With respect to the formula by which the bending moments were obtained, it is, as already stated, that known as the "theorem of three moments." I send the arithmetical working of cases I. and IV., which may be of interest to some of your junior readers



M_1, M_2, M_3, M_4, = bending moments.
a, b, c, = lengths of spans.
A, B, C, D, = supports.

Theorem of three Moments.—In the case of a continuous girder of any number of spans where the loading is uniform, the following relation between the bending moments over any three consecutive supports holds good:—

$$M_1\,a + M_3\,b + 2M_2\,(a+b) = \tfrac{1}{4}\,w\,(a^3+b^3),$$

using the notation given under diagram of girder.

CASE I.—This case is simplified by the bending moments over B and C being equal to one another. Substituting the values, we have—

$$16\,M_1 + 20\,M_3 + 72\,M_2 = 3024$$

but $M_1 = \text{zero} \therefore 20\,M_3 + 72\,M_2 = 3024$

and since $M_2 = M_3$ $\quad 92\,M_2 = 3024$

$\therefore M_2 = 32{\cdot}87$ ft.-tons

and $M_3 = 32{\cdot}87$ ft.-tons

CASE IV.—In this case a simultaneous equation has to be used, and it may be remarked that in general a series of simultaneous equations has to be solved in working continuous-girder problems. Forming the equations and substituting values as before—

$$16\,M_1 + 20\,M_3 + 72\,M_2 = \tfrac{1}{4} \times 8000 \quad (1)$$
$$20\,M_2 + 16\,M_4 + 72\,M_3 = 3024 \quad (2)$$
$$M_1 \text{ and } M_4 = 0$$

Hence,
$$20\,M_3 + 72\,M_2 = 2000 \quad (3)$$
$$72\,M_3 + 20\,M_2 = 3024 \quad (4)$$

multiply (3) by 18 and (4) by 5
$$360M_3 + 1296M_2 = 36000 \quad (5)$$
$$360M_3 + 100M_2 = 15120 \quad (6)$$

Subtracting (6) from (5) $1196M_2 = 20880$ (7)

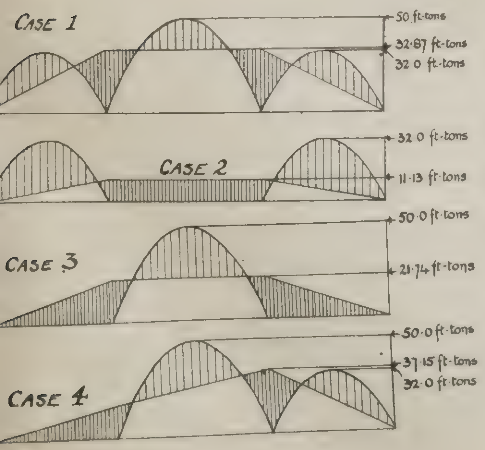
$\therefore M_2 = 17{\cdot}46$ ft.-tons.

Again multiply (3) by 5 and (4) by 18
$$100M_3 + 360M_2 = 10000 \quad (8)$$
$$1296M_3 + 360M_2 = 54432 \quad (9)$$

Subtract (8) from (9) $1196M_3 = 44432$ (10)

$\therefore M_3 = 37{\cdot}15$ ft.-tons.

Yours truly,
DE SILVA.



"The Matron and the Architect."

To the Editor of the BUILDERS' JOURNAL.

SIR,—Referring to the note on this matter in your issue for last week, I have at all times found consultation with the officers of a hospital—or for that matter any public building—of the greatest value and assistance. From no one is it possible to learn more about the inner working of a building, which so greatly affects the details and some minor arrangement of rooms, &c.

On large matters of principle the case is somewhat different. The architect must be guided by a wider experience and by less personal views. The last sentence of the extract you quote is a case in point. It is a sound principle that nurses (be they sisters, charge nurses, or probationers) when off duty should go right away from their wards—preferably even out of the building; and this principle is one which should not lightly be disregarded for a mere matter of convenience. The provision of sisters' sitting-rooms next the wards is a retrograde step, and subversive of the principle.

By the way, we all know that ladies love cupboards. In reason they (cupboards, of course) are most necessary and useful, but fewer will be required when housewives realise the futility of hoarding rubbish of all kinds. Cupboards are but too often the refuge of those who have not the courage to "scrap" things for which any further use is but problematical. They pin their faith to an old saying to the effect that if you keep a thing seven years it is safe to "come in useful" in the end.—Yours truly,

A. SAXON SNELL, F.R.I.B.A.
LONDON.

Protection from Lightning.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—The rules of the National Fire Protection Association of the United States, published in your issue of December 19th, are a slight improvement on the misleading and self-contradictory report of the so-called Lightning Research Committee of 1905, but they are absolutely useless for practical purposes, as all such rules must of necessity be. Protection from lightning is not to be obtained by rules, simply because it is impossible to condense the subject down to a few concise recommendations. Buildings differ so much from one another, not only as regards their form (which is after all of secondary importance), but as regards the innumerable threads of conducting material disposed throughout them, that rules applicable to one case would be useless for another, even though the general design were similar. Probably the best rules published are those of the War Department. Originally compiled about fifty years ago by Sir Wm. Snow Harris, Advisor to the Crown on Lightning Conductors, they were afterwards revised to accord with the report of the Lightning Rod Conference of 1881, and now form a bulky volume containing a mass of information on mechanical details. They miss, however, the essence of the matter—which is, that knowledge and an intelligent appreciation of the principles involved are required to apply the rules. It may be said that there are three methods of protecting buildings—(1) *The cage system*, by which a building is covered with a close-meshed network of conductors, resembling a bird-cage, which forms a screen against any electrical effects in the interior: (2) every particle of metal in and about a structure could be connected to one another and to the conductor system so that, there being no gaps or breaks between metals, no sparks could possibly occur in the interior. Both these methods are theoretically perfect, and they require no knowledge of the subject or study of the conditions existing in the building, but they are prohibitive as regards cost and absolutely impossible of application to the majority of buildings. To apply a partial cage system, or to connect some metals only and leave others unconnected without a thorough knowledge of the result would not only do away with the theoretical advantage of the methods, but would in many cases be liable to render the risk of damage more hazardous. The third method, which I regard as the practical one, gives the maximum of efficiency with the minimum cost, but it necessitates a thorough study of the subject and very careful consideration of the structure to be protected. It consists of applying continuous lines of metal from those parts (and those only) which are exposed to be struck by lightning, to consider what would be the effect if lightning discharges occurred, and to make connections across any sparking gaps that might be found to exist, either between the conductor and other metals or between those other metals themselves, if the sparks were calculated to do harm. Those metals which it might be impracticable, or even harmful, to connect should be avoided by carrying the conductor so that it is within sparking distance. The compilers of the American rules which you publish state that their regulations are only put forward as suggestions for use under "most conditions," but they are very unsatisfactory as regards the area of protection assigned to a conductor. A metal roof 60ft. by 60ft. would be a conductor in itself so far as it extended, and it might only be necessary in some cases to run lines of metal from it to earth in several places, due regard being given to the complications of metal in the interior; but if it had brick chimney stacks extending above it the problem would be an entirely different one, for they might easily be placed so that every one was exposed to be struck and shattered by a lightning discharge in its course to the roof. Also, if the roof were not of conducting material, the question as to whether it was flat or peaked would materially affect the number of points exposed to be struck, and therefore requiring protection. The recommendations in 1 (a) are, however, contradicted by those in (b), which even go to extreme lengths. The advice given in 1 (d) if followed implicitly, would be liable to cause the fires that the rules are designed to prevent. For instance, to run a branch conductor into the interior of a building for the purpose of connecting a girder so far away that it would not affect the problem would be a costly proceeding, and one that most architects would strongly (and rightly) object to, and this branch, if it happened to pass near a soft-metal gas-pipe (which, it is stated, must *not* be connected) would cause a fire by opening up an alternative path of metal to earth through the gas system! Rule 5 (c), if strictly followed, would obviate this, but many readers would fail to notice that one governed the other. Most of the other rules are based on the report of the Lightning Rod Conference of 1881. America, like most other countries, looks to England as the highest authority on the subject as regards main points of procedure; even as regards the use of copper in place of iron, the Americans are now adopting for their best work the metal which we in this country have used for so many years. The use of an iron tube, suggested in 7 (e), as an alternative to the copper plate, may, however, fairly be regarded as an American idea, for it has been used in the States for the past fifty years. Iron tubes for earth connections were tried in England many years ago, but they did not find favour here.—Yours truly,

ALFRED HANDS, F.R.M.S.

London.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

The querist's name and address must always be given, not necessarily for publication.

Liability for Delays under Contract.

Kent.—Contract writes: "A builder who has entered into a contract to complete a building by a certain date, under a penalty for non-completion of so much per week for every week that the work is delayed beyond that time, has failed to do so. Certain extra work had to be done in connection with the contract, but for which reasonable time was allowed him beyond the contract time. He now maintains that he is not liable for any delay, as the extra work given to him (although he was allowed ample time to complete such extra work) broke the contract so far as the time penalty was concerned, and further, that as no bonus was offered to him to complete the work in less than the contract time, he is not liable for the penalty for non-completion. (1) In a contract in which provision is made for extras, should any extra work (for which reasonable time is allowed) nullify the time penalty for the other portion of the work under the contract? (2) Should the absence of a bonus for completing the work in less time than that specified make the penalty for non-completion void? (3) Where a portion of the work has to be provided by specialists (and who delay in supplying the goods owing to being unable to execute them in the necessary time), and at the same time the contractor, knowing that these goods had to be supplied, undertook to complete the whole of the works, including the erection of these goods, within a specified time, and then fails to do so, should the contractor be allowed the time that he has been kept waiting for the goods? The contract form used in this case was not the usual R.I.B.A. form of contract, but I shall be glad to know (4) if, under the R.I.B.A. form of contract the architect is the sole person to say what penalty the contractor shall be liable for, in case of delay in a contract, or whether the question of delay is one that must be submitted to arbitration, as provided for under clause 32 of the conditions of contract?"

(1) It is exceedingly difficult to enforce a penalty for non-completion of any contract in which alterations have been made, and I am doubtful whether you will be able to substantiate a claim for damages in the circumstances mentioned, if much extra work was ordered—unless indeed a bargain was made, at the time the extras were ordered, that so much extra (definite) time was to be allowed. Of course, if there has been a great and avoidable delay, the case is different; but the onus of proof lies with the employer and not with the contractor. In all such matters the law will import the word "reasonable," whether the contract so states or not. (2) No. The absence of a bonus makes no difference—the contract was to do certain work under certain conditions. (3) The contractor must have used his best endeavours to procure the goods from the specialists, but is otherwise not liable for their delay if a certain firm was indicated by the specification or subsequently by the architect. (4) R.I.B.A. condition 24 clearly answers your question—"the architect shall certify." The R.I.B.A. conditions have a clause by which an arbitrator is named, and personally I always insert the name of a neutral person. I believe, however, that it is quite common practice for an architect to insert his own name. This arbitration clause was the subject of dispute between the R.I.B.A. and the Institute of Builders for some years, and I believe has never been accepted by the latter body. If your contractor is willing to submit your differences to the arbitration of a third party, I should recommend you to so settle this question, rather than to press a legal action upon your own *ipse dixit.*

X.

Pulling Down Old Cottages.

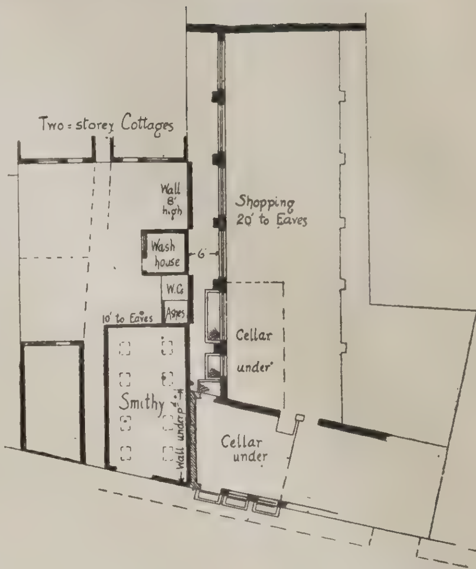
Hereford.—G. B. writes: "A row of old cottages in a narrow bye-street has been pulled down and new cottages erected in place of them, but several feet further back than the old buildings, in order to meet the requirements of the bylaws. The front wall of the old cottages will be pulled down to the ground level and will form the foundation for a low boundary wall with railings on top. Can the Town Council claim the land in front of the new cottages if the old wall beforementioned is pulled down to the ground level, or shall we have to leave part of the old wall standing for several inches above the ground in order to retain ownership of the land in question?"

There is no fear that you will lose possession of the strip of land in front of your new buildings, and you may pull down the old wall and rebuild upon its site if you so choose. Probably you have some idea that because the narrow street is not 36ft. wide the local authority have power to take land without compensation in order to make it that width—but this is not the case. They may require a new street to be set out that width, but not an old one.

F. S. I.

Adjoining Owners' Right of Light: Underpinning.

Birmingham.—A. writes: "(1) Having just completed the erection of a two-storey factory, as shown by the accompanying sketch, the owners of the adjoining property have written saying such building has interfered with their light, and unless we are prepared to compensate them they will erect hoardings. The new shopping is double lighted, and the matter would not be serious if the hoardings were erected. The windows of the adjoining property (two-storey cottages) do not overlook us; also, we have set back 6ft. The height of the new shopping is 22ft. to the eaves. Have the adjoining owners any right for claim? (2) Another point they have raised is with reference to the one-storey building in front (smithy). In getting out ground for cellars next same it was necessary to underpin their wall, 21ft. long, 10ft. deep, with 9in. brickwork in cement. They now claim for trespass on their property. The smithy was in a very shaky condition, there being no footings to same, and I contend that we have considerably improved their property. My client holds me responsible, and says I ought to have obtained permission to underpin."



(1) I presume that the new building you have recently erected is not in lieu of a previous building possessing ancient lights over the neighbouring property. Whether the new factory has interfered with his light or not, the owner of the cottages has an undoubted right to place hoardings in front of your new windows—upon his own land, of course—at any period within nineteen years and a day of the time of their first opening. I advise you to come to some arrangement with him, if the light is of consequence to you. The payment of a lump sum as compensation, rather than of an annual rental, appears to be desirable. (2) The fact that your neighbour's building was in a shaky condition did not justify you in doing anything to it, and, so far as I can tell from the plan, its wall was in no sense of a "party" character. Had a claim for trespass been made during the building operations, it would have placed you in a rather awkward position, but as I understand your client is now in no way making use of the wall (his own being in front of it) I cannot see how any action for trespass can possibly lie—*no damage has been sustained.* You have of course forfeited all ownership in the wall which you placed on your neighbour's land—it is now his property.

X.

Claim for Improper Use of Plans.

P. writes: "Some time in 1905 a client of mine—a builder—was asked to prepare plans and submit an estimate for putting in a new shop front, no suggestion being made at the time that anyone else was to do the work. The plans were prepared and estimates submitted, but my client heard nothing more of the matter until some months later, when he ascertained that the work was being carried out by another firm, partly on the lines of his plans. He thereupon communicated with the parties concerned, and received a reply stating that his estimates were not so favourable as another. This was the first intimation my client received that anyone else had been asked to tender. He now claims payment for the plans, which have not been returned to him, and is met by the reply that the owner of the shop considers himself under no liability. It appears to me that my client has at any rate an equitable claim, but the point is a somewhat technical one. Can you refer me to any cases on the point?"

Your client has been very badly treated, and should have been informed in the first place that he was asked to enter into a competition. I know of no decided case upon this particular point, but as the question of remuneration no doubt depends upon that of "employment for the purpose," I much doubt whether any legal remedy exists. The plans have not ceased to be your client's property, and he can demand their return. F. S. I.

Whitening Portland Stone.

MANCHESTER.—S. H. P. writes: "Can you inform me how Portland stone may be made to look white artificially? I am told that this may be done by the use of some chemical solution. I proposed to apply it to some internal work."

It might be done by the use of dilute sulphuric acid or hydrochloric acid, but such treatment would tend to promote decay afterwards.

Specifications and Estimates; Architects' Fees.

NEWCASTLE-ON-TYNE.—STUDENT writes: "(1) Is there a special method for preparing short specifications and estimates suitable for designs of buildings submitted in competition? (2) Do you know of any book giving full particulars about architects' fees?"

(1) Not so far as we know. Every competitor seems to adopt his own method. (2) See "Specification No. 9," price 2s. 6d. nett, or 3s. 3d. post free from our offices.

Memoranda Books, Agreement Forms, &c

GORSEINON.—J. O. P. writes: "(1) Are there any diary or memoranda books for the building trade—something like 'Mechanical World' diary in the engineering trade? (2) Where can I get forms of agreement and schedule of conditions for building contracts, certificates and forms for writing specification?"

(1) Not so far as we know. There is Hurst's "Architectural Surveyors' Pocket Book," but the cheapest memoranda book is "Specification" (for price see preceding enquiry).

Fumigated Oak.

LONDON.—S. T. writes: "Is there any means of reducing the shade of fumigated oak if done too dark?"

We do not know of any.

Stains on Portland Stone.

MANCHESTER.—S. H. P. writes: "Can you tell me how to remove Portland cement stains from Portland stone?"

We do not think you can remove them.

Fire-places for Coal and Peat.

CLEVEDON.—CONSTANT READER writes: "Kindly explain the difference between a fire-place to burn coal and a fire-place to burn peat. They should be up-to-date."

NEWCASTLE-ON-TYNE.—X. writes: "I shall be glad of any information as to sizes and construction of fire-places and chimneys in districts where peat is used for fuel; or will ordinary fire-places answer that purpose?"

See the reply on p. 10 of our issue for last week. We do not understand why several enquiries of this uncommon nature should reach us just now.

Employment in Cairo.

EALING.—ENQUIRER writes: "Please inform me as to chances of employment in Cairo in the Public Works Department or other departments of work."

We do not think there are any openings to be obtained except by competitive examinations and local opportunities.

Book on Village Halls.

CARDIFF.—D. F. J. writes: "Please inform me of an inexpensive book on the planning of village halls and institutes."

We know of none.

Our Plates

Birmingham Council House Extension.

Particulars of the selected design for the Birmingham Council House extension were given on page 4 of our issue for last week, and it is consequently not necessary for us to repeat them here, more particularly as the plans are themselves explicit. The competition was an important one, the building being estimated to cost £150,000. Messrs. Ashley and Newman are therefore to be congratulated on their success in competition with many well-known architects. The site is bounded by Congreve Street, Edmund Street, Margaret Street, and Great Charles Street, and there is a fall from the rear to the front, as indicated by the levels on the plans. The bridge shown in the perspective view spans Edmund Street and joins with the existing building, forming a picture gallery which leads out of the Round Room of the present gallery in the old building.

THE ORDERS.

As announced in our issue for last week, we have decided to re-publish the plates of "The Orders" which have appeared in THE BUILDERS' JOURNAL during the past few months. There are twelve plates in the series, and being on thin card they will be thoroughly serviceable for constant use on the drawing-board. The price of each plate separately will be 6d.; the whole series 6s.; and we have arranged that subscribers for the series shall be given, free of charge, a portfolio in which the plates can be kept. Readers should place their orders at once with the publisher, Technical Journals, Ltd., 6, Great New Street, London, E.C.

In continuation of the above plates of the Orders a further series of plates illustrating useful methods and memoranda for draughtsmen will appear shortly in our columns, and these plates also will in time be published in separate form for use on the drawing-board.

The new Post-Office Building, on the site of Christ's Hospital, Newgate Street, is about to be commenced. It will occupy two out of the three acres and a-half which the site comprises. The building will take three years to erect. As already stated in our columns, it will be of reinforced concrete.

R.I.B.A.

A business meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W.

The following were elected:—

Fellows.

Charles Spooner (London).
T. H. Weston, (Bristol).

Associates.

M. J, Dawson (London).
H. G, Leslie (London).

Hon. Corresponding Members.

Robert Böker (St. Petersburg).
Louis Bonnier (Paris).
Frank Miles Day (Philadelphia).
Jean-Joseph Caluwaers (Brussels).
M. E. Cannizzaro (Rome).
Cass Gilbert (New York).
Georges Harmand (Paris).
Hermann Helmer (Vienna).
Virgil Nagy (Budapest).
Ludwig Neher (Frankfort-on-Main).
George B. Post (New York).
J. M. Poupinel (Paris).
A. Salm G. B. zn (Amsterdam).
Ventura Terra (Lisbon).
Don F. Arbós y Tremanti (Madrid).
Gustaf Wickman (Stockholm).

Mr. Herbert W. Wills, A.R.I.B.A., was to have moved a resolution in regard to officials executing public architectural work, but as this subject had recently been before the Institute it was decided to pass on to the next matter.

Assessors' Awards.

Mr. Wills then moved the following resolution, which was adopted:—

> This meeting considers that the assessor in a competition should refrain from any expression of doubt as to the relative merits of the designs placed in his award, such expression of doubt being calculated to weaken the effect of his award and to lead the promoters to override it, to the great detriment of the object aimed at—namely, the adoption of the best design.

County Hall Competition.

Mr. William Woodward directed attention to the terms of the competition for the new London County Hall, making special reference to the proposal to invite certain architects to submit designs in the final stage of the competition.

Limited Competitions.

On the motion of Mr. K. Gammell, A.R.I.B.A., the following resolutions were adopted:—

> That in view of the fact that limited competitions for public buildings erected with public moneys are a great injustice to the young and unknown members of the profession struggling for recognition, and also not in the best interests of the promoters, this Institute declares that such competitions should not be limited, and should take such steps as may be deemed advisable to discourage public bodies from instituting such competitions.
>
> That this Institute exert its influence in obtaining the abolition of the growing custom of penalising non-competing architects by retaining their deposit.

Scottish Builders and Scaffolding Regulations. — The Scottish Building Trades Federation, whose headquarters are in Edinburgh, have sent a petition to the Home Secretary with reference to the proposed regulations as to the erection of scaffolding and measures for the safeguarding of the lives of workmen while employed in the erection or repair of buildings. The Federation urge that if the regulations are to apply to Scotland the Scottish Building Trades should be directly represented on the Departmental Committee appointed by Mr. Gladstone to enquire into the subject. The different centres of the Federation throughout Scotland have been communicated with, in order that witnesses may be sent from Aberdeen, Dundee, Inverness, Glasgow and Edinburgh to give evidence before the Committee. Mr. W. Graham Yool said at the dinner of the building trades in Edinburgh recently that the framers of the regulations knew absolutely nothing about the conditions in Scotland as to the erection of scaffolding.

Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

Jan. 11. Reading.—*Erection of a new school* for 250 scholars at Swallowfield, Berks. Builders desirous of tendering are required to send in their names to the Secretary to the Education Committee, The Forbury, Reading, on or before Jan. 2, together with a deposit of £3 3s. for bills of quantities, which will be supplied by post. Plans, specification, and form of contract will be open for inspection at the Education Secretary's Office between the hours of 10 and 5. Tenders must be delivered at the office of the Education Secretary, on the form and in the envelope provided, not later than the first post on Jan. 11.

Jan. 12. Lylehill.—*Alterations and additions to Manse*, Lylehill, Templepatrick. Plans and specifications may be seen at the office of W. D. R. Taggart, 2, Wellington Place, Belfast. Tenders to be lodged before 12 noon on Jan. 12.

Jan. 12 Leamington Spa.—*Erection of two bicycle sheds* at the Secondary Schools, Avenue Road. Plans and specification may be seen at the office of the Borough Engineer, Town Hall. Tenders (endorsed) to be sent to L. Rawlinson, town clerk, Town Hall, on or before Jan. 12.

Jan. 12. Kirkcaldy.—*Alterations at The Town House* property, for the Town Council. The plan may be seen and schedules of quantities and specifications obtained upon application at the Burgh Surveyor's office, No. 10, Tolbooth Street. Tenders to be left with W. L. Macindoe, town clerk, Town Clerk's Office, Kirkcaldy, not later than Jan. 12.

Jan. 12. Gateshead.—*Erection of additional class rooms*, laboratory, &c., at the Secondary Schools, Durham Road. Plans and specification can be seen and bill of quantities obtained at the office of N. P. Pattinson, borough engineer, Town Hall, Gateshead, on payment of £1 1s. Tenders, sealed and endorsed "Tender for Additions to Secondary Schools," to be sent in on or before Jan. 12.

Jan. 12. Stifford.—*Erection of a disinfector block* and sundry work at the Hospital, Long Lane, Stifford, two miles from Grays, for the Orsett Joint Hospital Board. Plan and specification may be seen and quantities obtained at the office of C. M. Shiner, architect, the Gate House, Grays, between 10 and 5 o'clock. Sealed tenders, marked "Hospital Tender," to be delivered to J. Beck, clerk to the Board, 2, Orsett Road, Grays, not later than Jan. 12.

Jan. 14. Porth.—*Rebuilding of "The People's Hall"* at Porth, Rhondda Valley. Plans and specifications can be seen and bills of quantities obtained of A. Marks, M.S.A., architect and surveyor, Merthyr, on deposit of £2 2s. Sealed and endorsed tenders to be delivered to him on or before Jan. 14.

Jan. 14. Oldham.—*Erection of new Council School* in Brook Lane for the Education Committee of the Corporation. Plans and specifications may be seen and bills of quantities obtained upon application to Winder & Taylor, architects, Union Street, Oldham. Sealed tenders, endorsed "New Council School," must be delivered to the Secretary, Education Offices, Union Street West, Oldham, not later than 12 noon on Jan. 14.

Jan. 14. Gosforth.—*Erection of a new Council school*, to accommodate 400 scholars at Gosforth, near Newcastle-on-Tyne. Contractors desirous of tendering for the work should forward particulars of their name and address to C. Williams, secretary to the Education Committee, Pearl Buildings, Newcastle-on-Tyne, not later than Dec. 20, together with a deposit of £2 2s. Plans of the work may be inspected at the Committee's Offices, and tenders, endorsed "Tender for Gosforth Council School," must be forwarded to the Secretary not later than 3 p.m. on Jan. 14.

Jan. 14. Dublin.—*Extension of the nave and aisles* of St. Patrick's Cathedral, Newry, for the Most Rev. Henry O'Neill, D.D., Lord Bishop of Dromore, according to the designs and specification prepared by Ashlin & Coleman, architects, 7, Dawson Street, Dublin. Bills of quantities have been prepared for the work by A. B. Bruntz, surveyor, St. Andrew Chambers, 1, College Street, Dublin, and can be obtained from him. The plans, &c., can be seen at the architect's offices and at the Cathedral at Newry. Sealed tenders, addressed to the architects, to be delivered not later than 12 noon on Jan. 14.

Jan. 14. Romford.—*Erection of four sanitary annexes* at the Workhouse, in accordance with plans and specification prepared by J. Kennedy, architect, 25, Bedford Row, London, W.C., from whom bill of quantities and form of tender may be obtained, before Dec. 29, upon payment of a deposit of £3 3s. The person whose tender is accepted may be required to enter into a bond with two approved sureties in the sum of £250 for the due performance of the contract. Sealed tenders, endorsed "Tender for Sanitary Annexes," must be sent to W. Smith, clerk, 13, North Street, Romford, on or before Jan. 14 by 4 p.m.

Jan. 14. Old Trafford.—*Alterations and additions* at the Council Offices, Old Trafford, for the Stretford U.D.C. The drawings may be seen and specification, with quantities and form of tender, obtained on application to E. Worrall, the Council's Surveyor, any day during office hours on payment of a deposit by cheque of £3 3s. Sealed tenders on the form supplied, endorsed "Office Extension," and addressed to the Chairman, are due at the Council Offices by Jan. 14.

Jan. 14. Mountain Ash.—*Additions to Darranlas Infants' School*, Mountain Ash, to accommodate 150 children, for the U.D.C. Plans and specifications may be seen and forms of tender and bills of quantities obtained on application to W. H. Williams, architect, Town Hall, Mountain Ash, upon the deposit of £2 2s. The bill of quantities is to accompany the tender, but in a separate sealed and endorsed envelope. The Committee undertake to open only that bill of quantities sent in by the contractor whose tender will be accepted, and to return all the other bills of quantities unopened. Sealed tenders and sealed bills of quantities, endorsed "Darranlas Infants' School," to be received by A. Morgan, director of education, Town Hall, Mountain Ash, not later than Jan. 14.

Jan. 14.. Tibshelf.—*Erection of proposed Council School*, to accommodate about 320 children. Persons desirous of tendering for the work may see the drawings, specification, agreement, &c., at the office of the Architect to the Committee, St. Mary's Gate, Derby, between 10 a.m. and 4 p.m. except on Saturday, when they will be on view from 10 a.m. to 12 noon. A copy of the bill of quantities, specification, conditions of contract, and form of tender can be obtained at the architect's office upon payment of £1 1s. Sealed tenders, in envelopes provided for the purpose, endorsed "Tender for New Council School, Tibshelf," must be delivered to G. H Widdows, A.R.I.B.A., architect to the Committee, County Education Offices, St. Mary's Gate, Derby, not later than 5 p.m. on Jan. 14.

Jan. 14. Winchester.—(1) *The erection of a new school* at Totton; (2) the installation of low pressure hot water apparatus therein. Plans, specification, and conditions of contract may be seen, and bills of quantities obtained, at the office of W. J. Taylor, County Surveyor, The Castle, Winchester, between the hours of 9 a.m. and 5 p.m. (Saturdays 9 a.m. and 1 p.m.). A deposit of £2 2s. will be required for a copy of the bills of quantities for estimate (1). A similar deposit will also be required for a copy of the specification for estimate (2). Deposits must be made by cheque payable to Hants County Council and crossed Bank of England, or particulars will not be sent. Tenders, endorsed "Council School, Totton," are to be delivered to H. Barber, clerk of the County Council, The Castle, Winchester, by 10 a.m. on Jan. 14.

Jan. 17. London, S.E.—*Alterations and additions at the Infirmary*, Lower Road, Rotherhithe, S.E., according to plans and specification prepared by A. H. Newman, and quantities by W. T. Farthing & Son. Persons desirous of tendering for the works are required to send their names and addresses before Dec. 8 to E. P. Fenton, clerk to the Guardians, 283, Tooley Street, S.E., and to deposit with him a £50 Bank of England note. As soon after Dec. 8 as possible, forms of tender, bills of quantities, etc., and all other necessary information will be supplied to those persons whose names, addresses, and deposits have been supplied to the Clerk to the Guardians. The specification and plans of the works will then be open for inspection by such persons at the architect's offices, A. H. Newman, 31, Tooley Street, London Bridge, S.E., on production of the form of tender. Fair wages clause. Sealed tenders, endorsed "Tender for Alterations and Additions, Infirmary," must be delivered personally to E. P. Fenton, clerk, 283, Tooley Street, S.E., at 6 p.m. on Jan. 17, accompanied by the bills of quantities, &c., in a separate sealed envelope. The tenders will be opened and considered at 7 p.m. at the meeting of the Guardians on Jan. 17, at their Board Room, at which place, date, and time a responsible member of the firm tendering must be in attendance.

Jan. 15. Bovey Tracey.—*Erection of a store and stable building* at Bovey Tracey, for the Bovey Tracey and District Co-operative Society, Ltd. Persons desirous of tendering can inspect the drawings and specifications at the offices of J. W. Rowell, Sons & Locke, architects, 2, St. Paul's Road, Newton Abbot. Sealed tenders, duly endorsed, are to be delivered to them at or before 5 p.m. on Jan. 15.

Jan. 15. Farnworth.—*Construction of recreation ground* and bowling green in Harrowby Street and Mossfield Road, for the U.D.C., within their district. Drawings may be seen and quantities obtained at the offices of W. J. Lomax, A.M.I.C.E., surveyor, 11, Fold Street, Bolton, on deposit of a cheque for £2. Tenders, sealed and endorsed "Recreation Ground," to be delivered to W. Tyldsley, clerk, Council Offices, Farnworth, S.O., not later than Jan. 15.

Jan. 15. Enfield.—*Erection of a junior mixed school* at Bush Hill Park, Enfield. Applications for bills of quantities should be sent to G. E. T. Laurence, architect, 22, Buckingham Street, Adelphi, W.C., before Dec. 29, from which date the plans and specification can be seen at the above address. A deposit of £1 1s. should accompany the application. Sealed tenders, on the form supplied, must be delivered to N. Hepworth, clerk, Public Offices, Enfield, free of charge, not later than 12 noon on Jan. 15. The contractor whose tender is accepted will be required to enter into a bond with two sureties in the sum of £200 each for the due performance of the contract.

Jan. 18. Wallsend.—*Erection of police buildings.* Persons desirous of tendering are requested to send in their names to J. A. Bean. Bills of quantities will be forwarded on payment of a deposit of £2 2s. Applications to be sent to J. A. Bean, County architect, The Moot Hall, Newcastle-on-Tyne, where drawings can be seen. Sealed tenders, sent in the envelopes provided, to be delivered not later than 4 p.m. on Jan. 18.

Jan. 19. Durham.—*Erection of new lock-ups* at Ferryhill and Witton Park. Plans may now be seen and bills of quantities obtained at the County Surveyor's Office, Shire Hall, Durham. Sealed tenders, properly endorsed outside, to be delivered to W. Crozier, A.M.I.C.E., county surveyor, on or before Jan. 19. Security for the proper completion of the works will be required.

Jan. 19. Wakefield.—*Erection of new school* at Otley and alterations to existing school; additions and alterations to Kippax Provided School, and West Tadcaster Provided School; erection of new school at Thorne, near Doncaster, for the West Riding Education Committee. Plans may be seen and quantities obtained on application to J. Vickers-Edwards, county architect, County Hall Wakefield. A deposit of £1 is required in each case. Cheques to be sent to the West Riding Treasurer, County Hall, Wakefield. Sealed tenders, properly endorsed to be sent to the County Architect not later than 10.30 on the morning of Jan. 19.

Jan. 22. Whitestown.—*Erection and completion of a new War Signal Station* at Whitestown, County Louth. Tenders will be received up to 10 a.m. on Jan. 22. The plans and specification can be seen of H. Williams, secretary, Office of Public Works Dublin, and at Greenore Coast Guard Station, Co. Louth, where forms of tender may be obtained. The envelope containing the tender must be endorsed.

Jan. 22. Eltham.—*Erection of a refreshment house* at Avery Hill, Eltham, for the L.C.C.. Full particulars and also information as to the conditions to be observed by tenderers, will be given in the "London County Council Gazette" of Dec. 17, which can be obtained from P. S. King & Son, 2 and 4, Great Smith Street, Westminster (price 1d., post free 1½d. a copy). Tenders must be upon the official forms, and no tender will be received after 10 a.m. on Jan. 22.

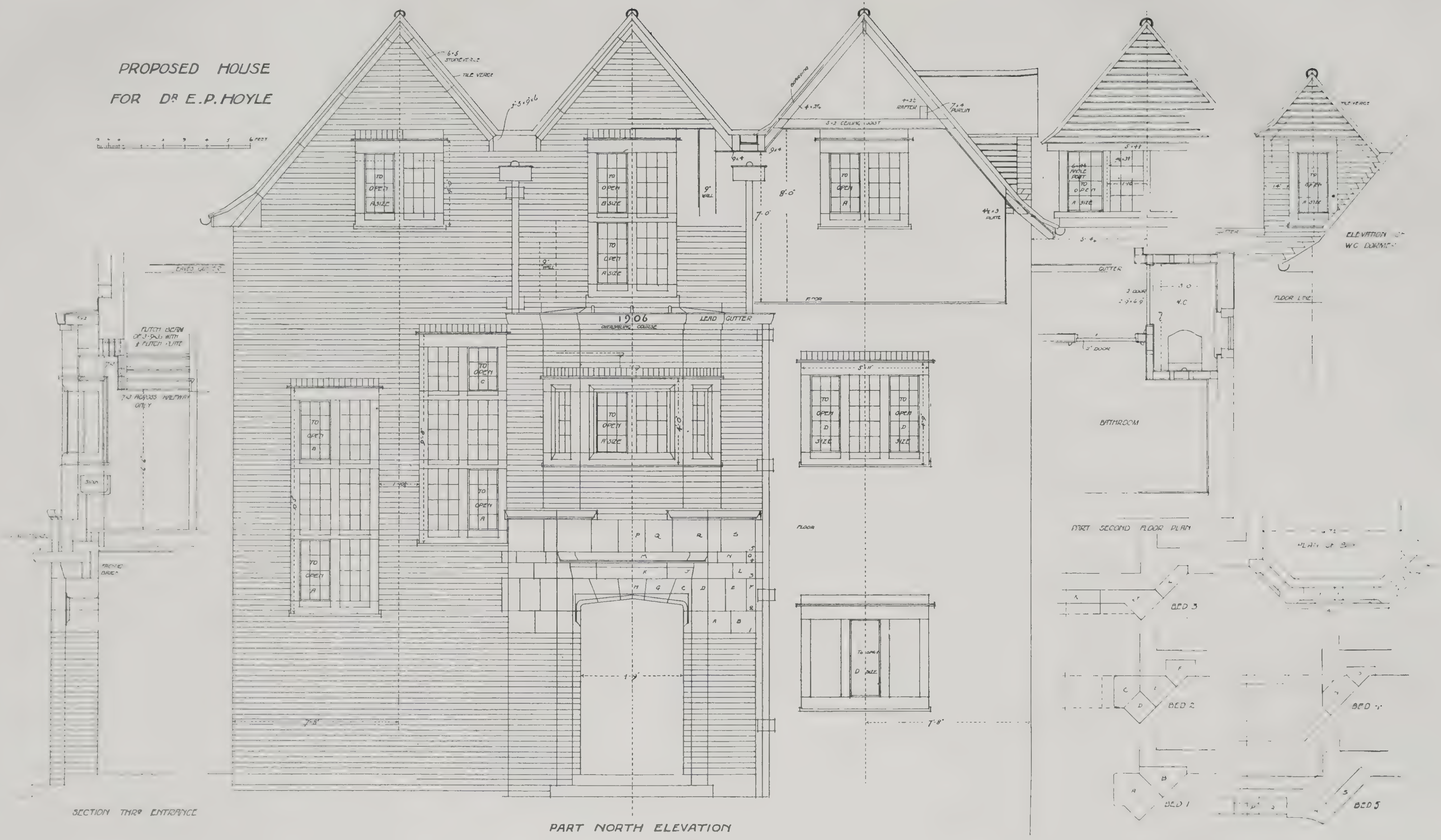
Jan. 22. London, S.W.—*Erection of a Secondary School* on a site in Hortensia Road, King's Road. Chelsea, S.W., for the L.C.C. Full particulars, and also information as to the conditions to be observed by tenderers, will be given in the "London County Council Gazette" of Jan. 7, which can be obtained from P. S. King & Son, 2 & 4, Great Smith Street, Westminster, S.W. Tenders must be upon the official forms, and no tender will be received after 11 a.m. on Jan. 22.

Jan. 22. Kilmarnock.—*Erection of the superstructure* of the new Post Office at Kilmarnock. Drawings, specification, and a copy of the conditions and form of contract may be seen on application to the Postmaster at Kilmarnock. Bills of quantities and forms of tender may be obtained from W. T. Oldrieve, H.M. Office of Works, Edinburgh, on payment of £1 1s. Tenders must be delivered on Jan. 22, addressed to the secretary, H.M. Office of Works, &c., Storey's Gate, London S.W., and endorsed "Tender for New Post Office Kilmarnock."

Jan. 22. London, E.—*1. The construction of retaining walls*, &c., at Prince Regent's Lane, Plaistow; (2) additional lavatory accommodation, cloak rooms and other sundry alterations, Town Hall, Stratford, for the County Borough of West Ham. Plans may be seen, and specifications, forms of tender, and further particulars obtained at the office of the Borough Engineer, Town Hall, Stratford, E., upon payment of £1 in each case. Tenders, endorsed "Tender for—1. Retaining Wall, Prince Regent's Lane; 2. Alterations, Town Hall, to be sent to F. E. Hilleary, town clerk, Town Hall, West Ham, E., not later than 4 p.m. on Jan. 22. Fair wages clause.

Jan. 23. Penge.—*Alterations to a water tank* at the Crystal Palace, in the U.D. of Penge and Beckenham. Forms of tender and contract, with specification, may be obtained on application to the Engineer, Southwark Bridge Road, S.E., on production of an official receipt for the sum of £2 which sum must first be deposited with the Comptroller at the Board's Central Offices, Savoy Court Strand, W.C. Such payments and applications must be made between 10 a.m. and 4 p.m. (except on Thursdays and Saturdays). Tenders, enclosed in sealed envelopes, addressed to the "Clerk of the Board," Metropolitan Water Board, Savoy Court, Strand, W.C., and endorsed "Tender for Crystal Palace Tank," must be delivered not later than 10 a.m. on Jan. 23.

Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, January 16th, 1907.



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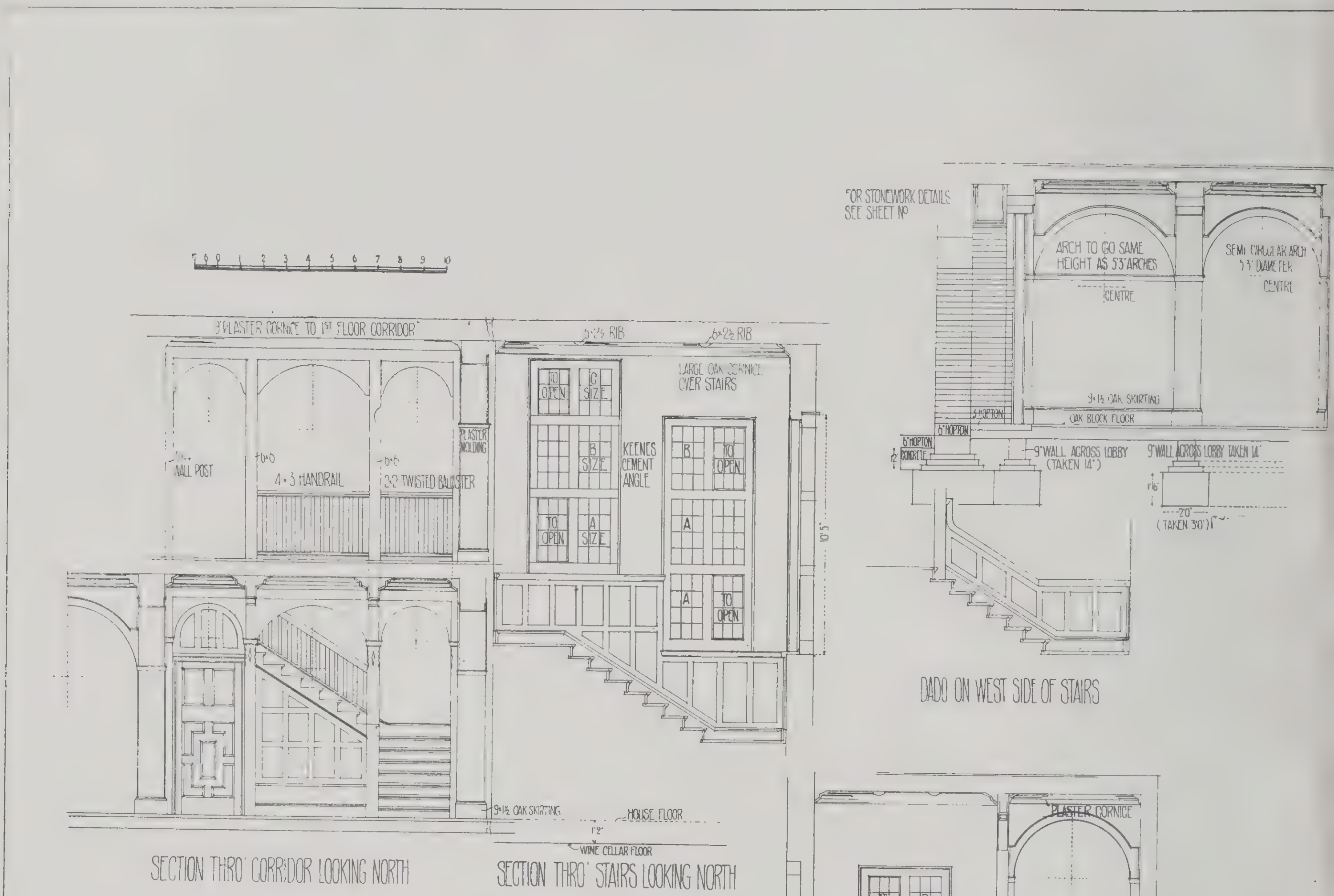


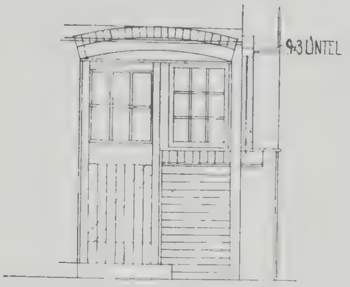
DADO ON WEST SIDE OF STAIRS

SECTION THRO' CORRIDOR LOOKING NORTH

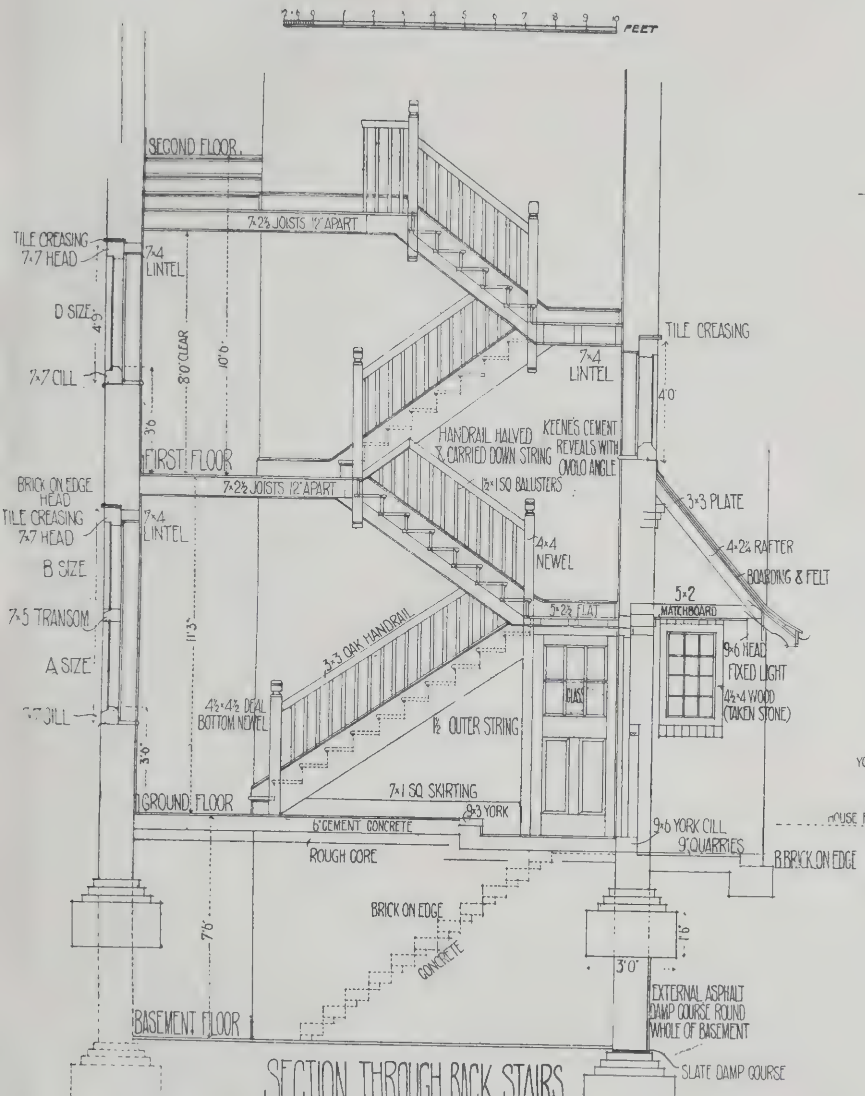
SECTION THRO' STAIRS LOOKING NORTH

SECTION LOOKING EAST

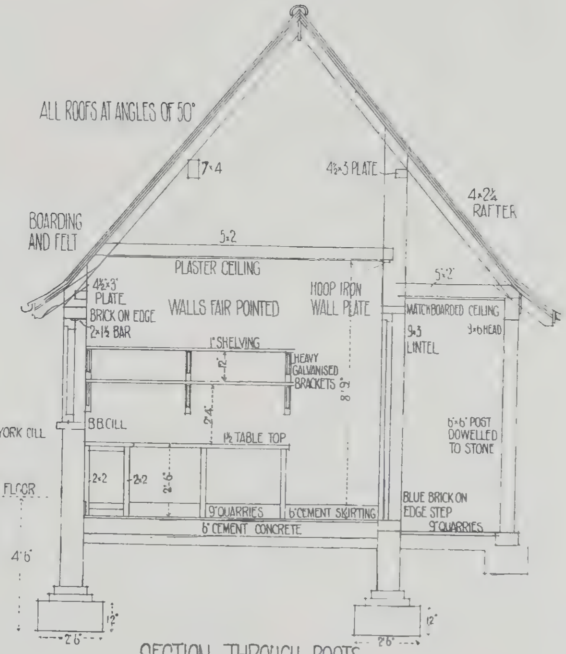
HOUSE AT EXMOUTH, FOR DR. E. P. HOYLE: WOR



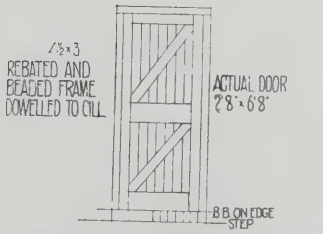
TRADESMENS ENTRANCE



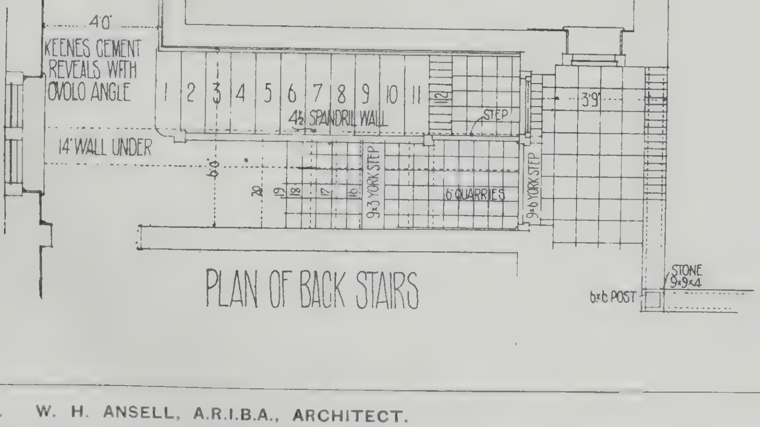
SECTION THROUGH BACK STAIRS



SECTION THROUGH BOOTS



DOORS TO COALS BOOTS AND OUTSIDE W.C THE SAME AS THIS



PLAN OF BACK STAIRS

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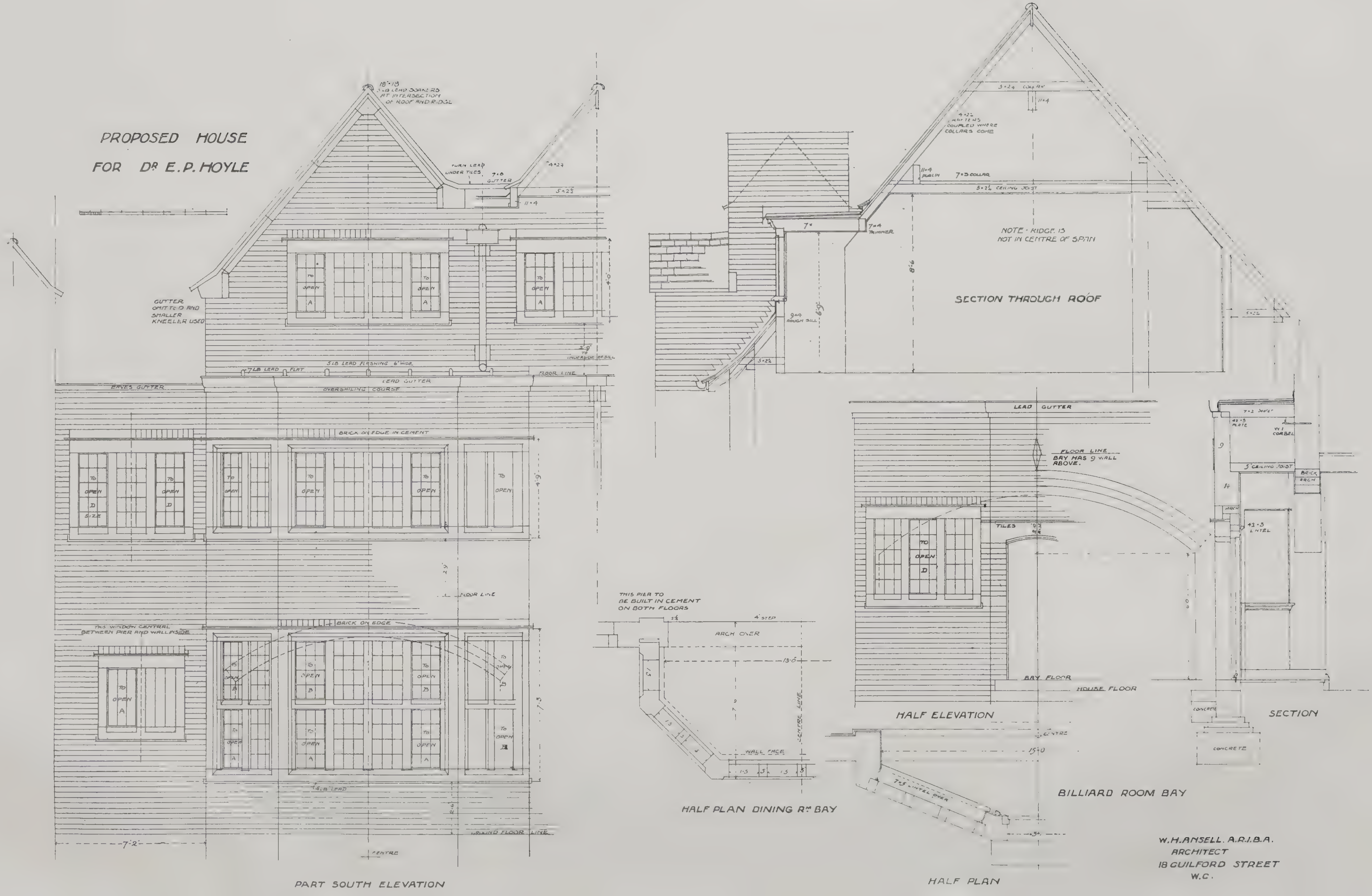

PROPOSED HOUSE

FOR Dr E.P. HOYLE

W.H.ANSELL. A.R.I.B.A.
ARCHITECT
18 GUILFORD STREET
W.C.

January 16, 1907. Volume 25, No 623

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

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The "Fire Supplement" is presented with this issue.

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Our Competition. The prize of five guineas which we offered for the best suggestion as to how the circulation of The Builders' Journal might be increased is awarded to

Mr. John G. Hinton, Architect,
of "Fyfield," St. Faith's Road,
Winchester,

and a cheque for the amount has been forwarded to him. We have received a large number of most valuable suggestions, but it is obvious that, in our own interests, it would be inadvisable to publish particulars of these or give any hints as to their nature, for they might then be made use of by our contemporaries. We are deeply grateful to all those readers who have responded to our request, and for the kind expressions of appreciation of The Builders' Journal which almost all contributors have added. When we embarked upon the course of inviting suggestions, we had no idea of the great variety we should receive, nor had we any suspicion of the difficulty of coming to a decision in regard to them. Many of the suggestions embody untried principles which offer much promise, and these required very careful consideration, and even then it was not possible to determine their value with any measure of accuracy. However, we shall adopt from time to time a good many of the suggestions offered, either in their entirety, or modified, or conjoined to other proposals. It appears to be the opinion of many readers that competitions provide a very promising means of increasing our circulation, while at the same time they form interesting features in themselves. With this we agree. It will be remembered that we have in the past promoted competitions for designs applicable to younger members of the architectural profession which have met with considerable success. Mr. Hinton's suggestion is of this nature, but it embodies a novel principle. We are maturing our plans, and in our issue for February 6th we shall begin a competition which will conform in principle with that awarded the prize. We feel sure this competition will create great interest, and as there will be many prizes we have little doubt that it will be very popular.

Architecture and the Free Libraries. We should be sorry to attribute any blame to the librarians for the want of attention in regard to the provision of technical books and periodicals in free libraries. It is the system that is wrong. The free library is generally looked upon as a means of entertainment, and any trashy novel seems to find a place on its shelves immediately it is published, while the books on architecture, building and engineering consist of a few old and out-of-date volumes. The librarian cannot be expected to know what should be added to his stock as regards technical books, and therefore our provincial architectural and engineering societies, and energetic members of the professions and trades, should make it their duty to help the librarians and library committees by calling attention to the omissions. Books should, as a rule, not be incorporated in the reference departments, for they are not nearly so serviceable there. If the libraries would lend out expensive technical books they would render a service to the nation which would be much more valuable than they at present give.

New, True, or Neither

Gentlemen who have at heart the honour of what Mr. Dooley pleasantly calls "lichrachoor" have recently been much exercised in their minds. You see, it's this way. People are getting very slack about inverted commas. They calmly incorporate the choice phrases of the great in their own writing without that meed of acknowledgment which decency demands, and inverted commas provide. References to the rising generation in rural schools are free with Gray's "mute inglorious Milton," but generally without inverted commas, and there are a thousand like instances.

All this leads me to realise the need of inverted commas in architecture. Building is an art which provides many opportunities for the bestowal of stolen thunder. Inverted commas on a gable or buttress do not seem very practicable. I can only suggest that some enterprising tile maker should put on the market a series of tiles with suitable legends which could be built into features which are frankly reminiscent. For example. On those nice slopy buttresses which are now so popular for country cottages, why not the legend—

OH, THANK YOU,
MR. VOYSEY!

* * *

It is sometimes stated that the R.I.B.A. examination papers are out of date and include subjects of no practical use. That such is not the case, however, the following question from a recent Intermediate paper explicitly proves:—

OUTLINES OF MEDIEVAL ARCHITECTURE.

"2. Give a clear outline plan of some famous English monastic building (including its church). Mark on the plan the names of the parts or buildings, and explain briefly their several purposes or uses."

The following is sent for insertion in our advertisement columns:—

Wanted, architect's assistant, thoroughly accustomed to the planning of medieval monastic buildings. None but those who have had actual experience need apply. Age not to exceed 25.—Apply, A. B. Bott, 9, Conduit Street, W.

* * *

There are so many architectural books waiting to be written. Why didn't Providence arrange for either Mr. Andrew Lang or Mr. Bernard Shaw to have an architectural education: then we should really know all about everything.

* * *

The cloud of anxiety which is hanging over the admirers of St. Paul's Cathedral will, I trust, soon be dispelled, either by assurances that there is no danger, or by vigorous steps being taken to do the needful strengthening works. The thought that anything like a disaster may overtake Wren's masterpiece fills one with an acute and almost physical sense of distress. Pepys records a similar feeling when the ruins of the burnt cathedral were being pulled down in 1668. "September 14th. Up betimes, and walked to the Temple, and stopped, viewing the Exchange, and Paul's, and St.

Fayth's, where strange how the very sight of the stones falling from the top of the steeple do make me sea-sick."

* * *

The village of Marford, a few miles from Chester, is an architectural curiosity. The cottages there might have been built by Horace Walpole, for they are uniformly of Strawberry Hill Gothic.

* * *

One sometimes gazes with polite amazement at such modern feats as factories bedizened with highly Gothic battlements, but what can one say of the long-dead architect at Marford who planned his sculleries like apses? Today the village strikes the architectural eye as a gigantic joke, a kind of comic epitaph to a dead effort to put back the clock. But it is a delightful and coherent village, for all that, and a modern inn built in the same dialect is not so absurd as, by all the laws, it ought to be.

COTTAGE AT MARFORD.

* * *

No self-respecting music-hall now lacks living sculpture. "The Rape of the Sabines" is a subject chosen for representation that is well-known to those interested in formal gardens, which are, or should be, the peculiar province of the architect. It was constantly reproduced in lead as a garden ornament in the eighteenth century, and one still adorns the gardens of Painshill, Surrey. To the R.I.B.A. I suggest that an agreeable novelty for the next conversazione would be some living sculpture. Perhaps Mr. Reginald Blomfield and Mr. Inigo Triggs would pose as, say, gladiators, and thereafter write a book entitled "The Architect as a Garden Ornament."

* * *

It is astonishing what ingenuity is expended on the brick. The writer in his lucid moments is engaged in commercial pursuits and has been amazed at the variety of ingenious dodges from the brains of inventive persons. It is to be doubted whether anything can be invented superior to the ordinary brick, which has had a good start on modern substitutes.

The brick market is rather depressed just now, but makers can console themselves with the thought that others have suffered in the same way. In 1666 a Dutchman called Kiviet came to England and persuaded Evelyn the Diarist to join him in a great brick-making industry. Evelyn, acute as he was, lost £500 in the adventure, but comforted himself by subscribing 50,000 bricks for the new quarters of the Royal Society, then building, in addition to £50 he had previously given. Evelyn would have been a useful friend to present-day charities.

THE LOOKER-ON.

THE TRAINING OF THE MODERN ARCHITECT.

In a paper on architectural education which he delivered before the last meeting of the Birmingham Architectural Association, Mr. A. S. Dixon, M.A., suggested that the professional education now open in Birmingham to architectural students was incomplete on both the practical and the scientific sides.

Convenience in planning, solidity in construction, combined with a due limitation of the quantity of materials to be used, presented problems with a view to which the present system of education afforded a not altogether inadequate preparation, though in these days, when materials such as steel and reinforced concrete were becoming of such great importance, the training which had been hitherto reserved for the engineer became more and more necessary to the architect. If, however, the attainment of the utilitarian qualities of a good building demanded a more scientific training on the part of the architect, the case became even stronger when they thought of those qualities which had a more spiritual character. He used "spiritual" partly because he wished to avoid that much vulgarised and misused word "artistic." The word had to cover what was the greatest quality of all—he meant

Expression.

There was a kind of expression which no building, however humble and however utilitarian, ought to lack—the expression of its own essential character, and the expression which came from an exact and delicate adaptation of the means to the end in view. It was, he believed, this quality of expression which more than any other led the way to the interest and beauty and dignity of a building. One of the most delightful things in the world was a medieval fortress. He could find no better illustration of delicate adjustment of material to its purpose than the vaulted choirs of the great thirteenth-century churches, such as Westminster, Amiens, and, most of all, Beauvais.

Knowledge of Materials: Engineering for Architects.

The mastery over materials which was certainly attained by the medieval builders was no doubt gained on the job and in the workshop, without much (if any) help from university schools or books; but the materials which he had to study were comparatively few, and so were the purposes for which they were used, while the methods of their use might be said to have been included within the limits of a single living tradition with which it was quite possible to become thoroughly acquainted in the course of a few years of actual apprenticeship and practice. It was certain that could not be done now: other means must be found, and one of them was that architectural students should receive part of the training now given to engineers. They wanted a co-ordinated scheme for architectural students which would make it easy for them to get all the training they really ought to have; and one very great advantage which would follow upon this being done in connection with Birmingham University would be found in the splendid apparatus which was being provided there for testing materials of all kinds, whether in respect of tension, compression, or transverse strains.

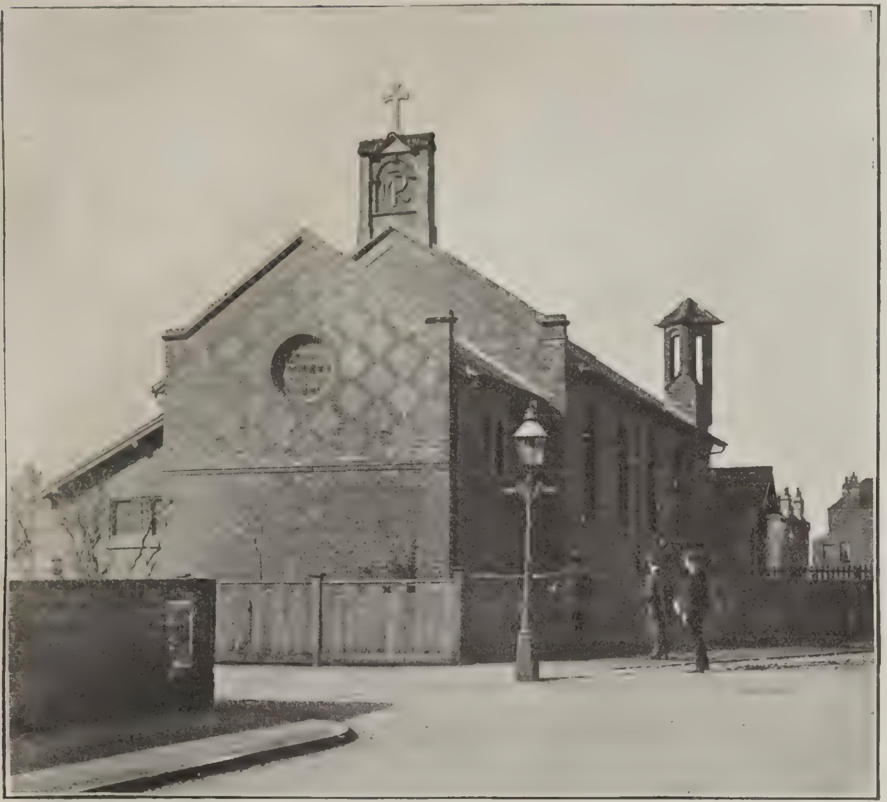
Bullied Buildings.

Some buildings looked as if the materials of which they were composed had been thrown together, others as if the materials had been bullied and kicked into their respective places; but the building which they loved to look at again and again was that whose materials looked as if they had been led together by a friendly hand, which had taken the trouble to study their characters, to find out what work each could do best and would do most happily, and had also taken thought to put each beam and each stone in that position in which it could perform its almost eternal function in self-

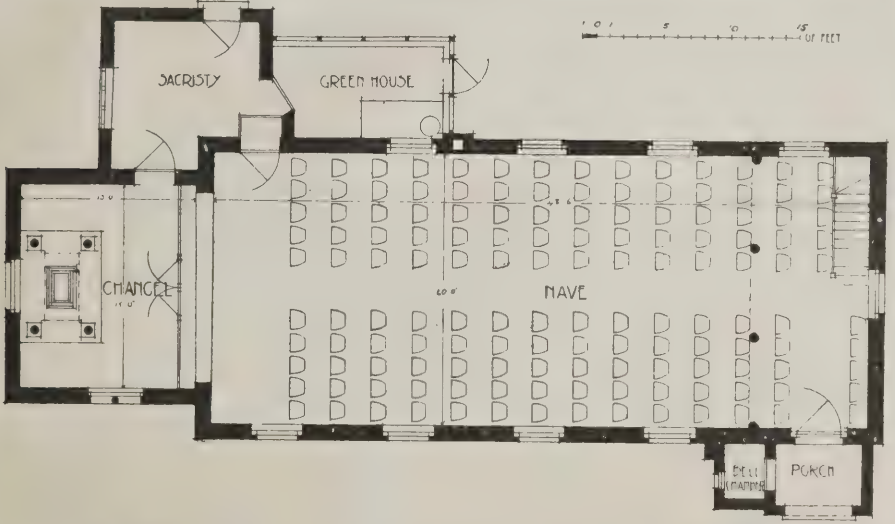
The Altar.

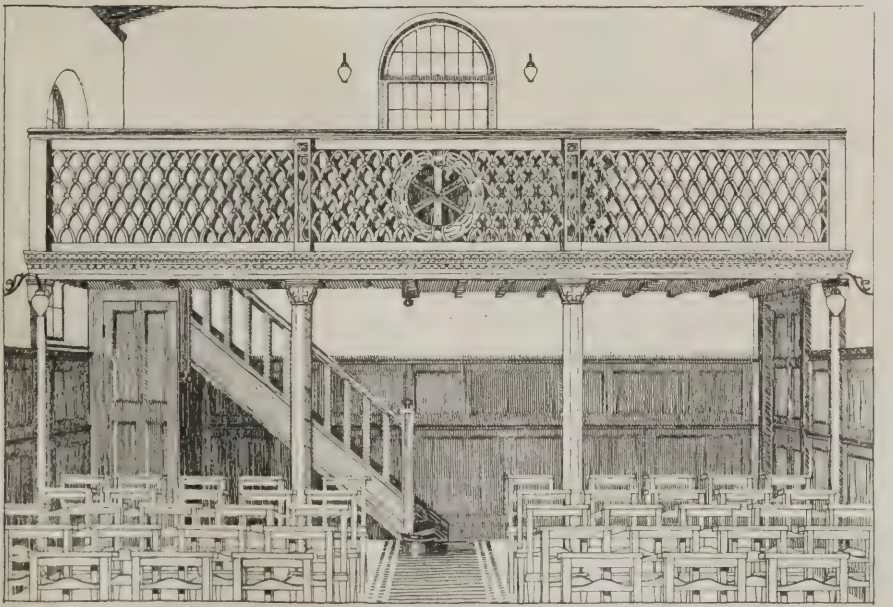
"The Good Shepherd," Matthias Zens, Sculptor.

FILEY ROMAN CATHOLIC CHURCH.



Chancel End





Gallery at West End.

ROMAN CATHOLIC CHURCH, FILEY, YORKS. A. N. PRENTICE, F.R.I.B.A., ARCHITECT.

respecting and happy tranquillity. They must learn to play with their stones and beams like friends, rather than order them about like a squad of stokers.

Craft-Training.

If it were possible to provide classes for students in which they would become familiar by actual practice with the work of the carpenter and mason, and perhaps the bricklayer and plumber, it would be of very great advantage.

It would seem that on the practical side at least there was in Birmingham already in embryo and on paper the elements of what they wanted. An architect ought to have actual practical familiarity with such matters as the various methods of finishing masonry, methods of bedding, bonding, and pointing, &c. It was only by such practical familiarity with materials and their treatment that they might hope to avoid what had been for some long time the Scylla and Charybdis of their profession—the Scylla of the pedantic copying of ancient form, and the Charybdis of the fanciful and effeminate vagaries of "the new art," which had sprung up to no small extent in brains unsanctified by wholesome contact with the stocks and stones of Mother Earth.

The essential point was the co-ordination and direction of architectural studies, and, so far as Birmingham was concerned, he supposed the ideal solution would be a chair of architecture at the University. Liverpool had its chair of architecture, and they might have theirs eventually. In the meantime, it would be of great use if they could have a committee to consider the whole question.

FILEY ROMAN CATHOLIC CHURCH.

The simple little church which has been built at Filey, Yorks, from designs by Mr. A. N. Prentice, F.R.I.B.A., is exciting considerable interest in Roman Catholic circles, and is shortly to be reproduced in Baltimore and Monticello, U.S.A. It follows the style of the oldest basilicas. The plan is regular and the nave, which has a small gallery at the west end, is lit by four semi-circular-headed windows on either side; whilst the east end of the building forms the chancel. The accompanying photograph shows the exterior of the building, a prominent feature being the panel over the gable to the chancel arch, bearing the oldest monogram of the Virgin Mary, M.R. The altar is modelled after the one kept in the Rimini Museum, Italy, of the 5th century. The baldachino is designed from an ancient one at Verona. The chancel will soon be enriched with the statue of the Good Shepherd, here illustrated; it is a direct inspiration from the oldest statue of Our Lord, kept in the Lateran Museum at Rome. The photograph we reproduce was taken a short time ago in the studio of the great artist, Matthias Zens, of Ghent. In the design of this interesting little church Mr. Prentice has carried out the ideas of the Rev. Eugene Roulin, the priest at Filey.

Mr. Wm. Mackison, F.R.I.B.A., F.S.A. Scot., of Dundee, died recently, aged 73.

Mr. Charles Cobb, architect and estate agent, of Enfield, committed suicide recently by cutting his throat. Evidence at the inquest showed that he had for a long period suffered from sleeplessness and depression, due to a severe form of influenza.

FIG J

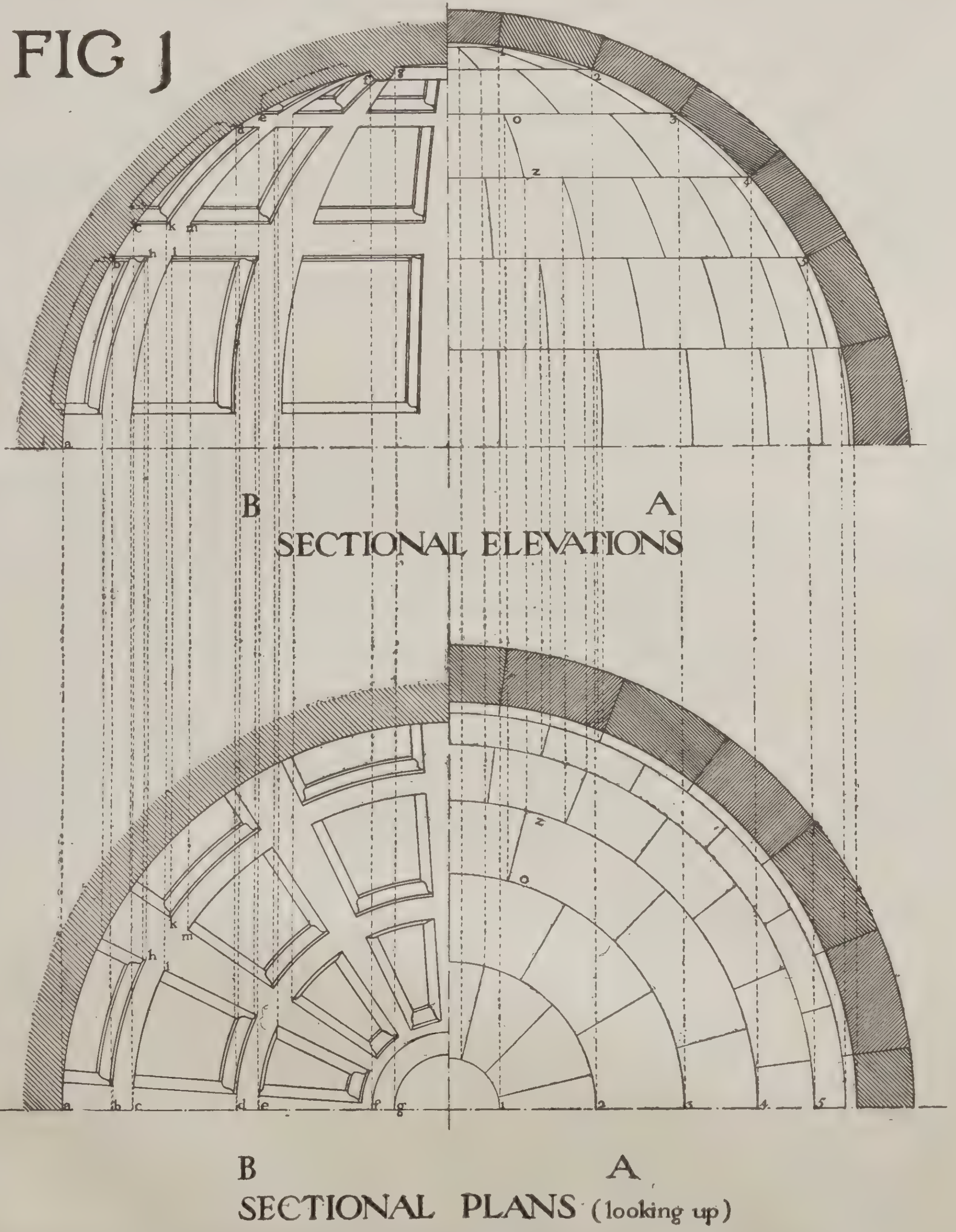
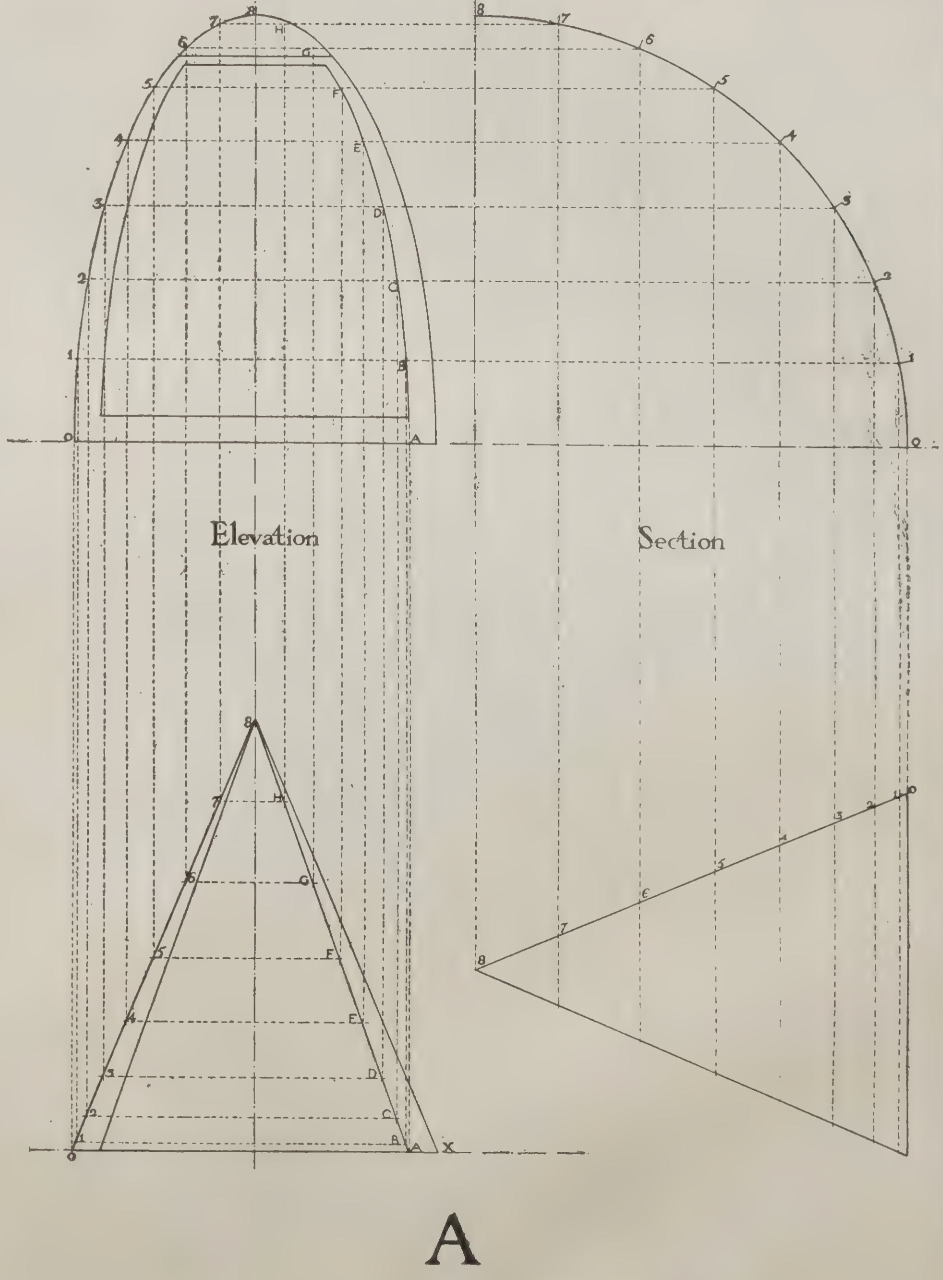


FIG 2A



"NOTES FOR ARCHITECTURAL DRAUGHTSMEN"; DOMES. By ALFRED W. S. CROSS. M.A., F.R.I.B.A., and ALAN E. MUNBY, M.A.

NOTES FOR ARCHITECTURAL DRAUGHTSMEN.

By Alfred W. S. Cross, M.A., F.R.I.B.A., and Alan E. Munby, M.A.

PART II.

Introduction.

A description is here given of the methods of dealing with a few of the constantly-recurring problems incidental to the work of a draughtsman, and although any selection of examples culled from so wide a field must be open to some criticism, the instances given are at least amongst those that have been found to present occasional difficulties.

Domes.

Fig. 1.—Two domes are shown in this figure, each being represented by a quarter-plan looking up and by a sectional elevation. On the right (Fig. A.) a simple stone treatment is represented. To set this up, draw the vertical centre line and a horizontal line at the springing for the section, then set out the internal line of the section decided upon (in this case the quadrant of a circle), and the sectional joint lines 1, 2, 3, 4, 5, 6, which, in the case of a hemispherical dome, usually radiate from the centre of the sphere, their distance apart being fixed by the size of the stone available. These joints, being horizontal in elevation, may next be drawn in elevation from the figures on the quadrant. From a point upon the central line, using the radius employed for the section, draw the quadrant of the plan, and mark off on the horizontal line at the bottom the joint lines of the stones from the points 1, 2, 3, &c., on the section, by projecting these points as shown by vertical dotted lines. From the points 1, 2, 3, &c., on plan, with the centre of the dome as centre, draw quadrants which will be the horizontal joint lines on the plan. Radiating from this centre draw joint lines on the plan, spaced according to the sizes of the stone to be used, and project the ends of these lines up to the elevation till they cut the corresponding courses, as at O Z, and draw he joint lines between these points, which n elevation are usually arcs of large circles.

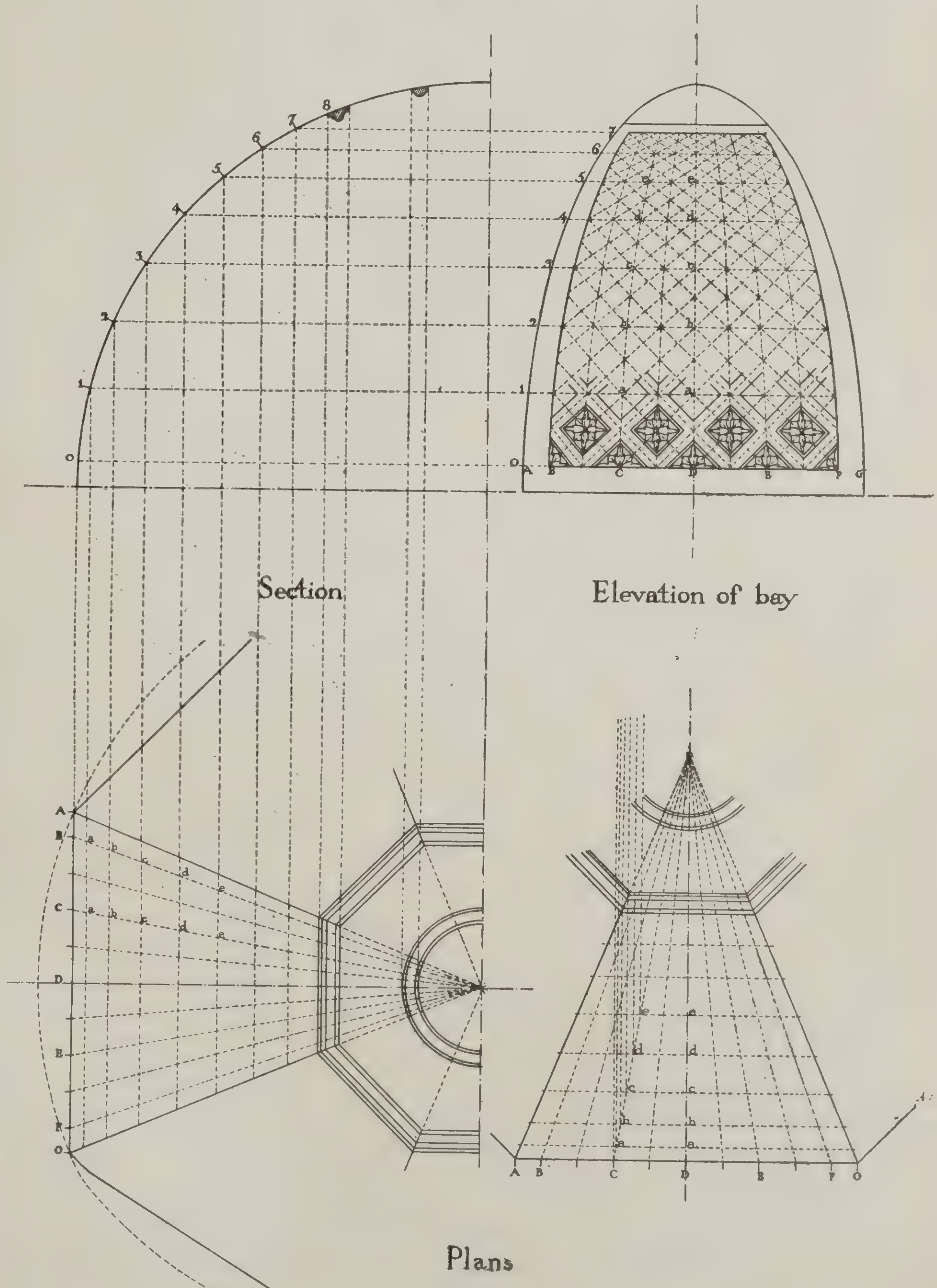
The left-hand side of the accompanying Fig. 1 (B) shows the setting-out of a panelled dome. Draw the interior arc of the section and mark upon t the panels decided upon as shown by the dotted lines, and rule off rom them the horizontal ribs in levation. Draw the quadrant of the lan vertically below the section and project the points, *a*, *b*, *c*, &c., for the horizontal panels on the section vertically n to the horizontal line forming the iameter of the dome, and from the oints so obtained, and with the centre f the quadrant as centre, draw the weeps of these ribs on plan. Set out he radiating ribs on plan as may be equired by the design, and from their ntersection with the horizontal ribs (*i.e.*, hose circular on plan) project vertically p, and mark the corresponding points of ntersection on the elevation as at *h*, *k*, *m*, and draw the transverse ribs, in levation, between these points. The anel mouldings which radiate on plan may now be drawn, their width being ransferred to the plan from the section here the panels are shown by dotted nes. These members can then be pro-cted upon the elevation from the plan. he elevations of the horizontal members of the moulding are obtained on the elevations from the section as shown, and the projection on to the plan of their intersections with the radiating members gives the points from which they may be centrally struck.

Fig. 2.—This figure shows the method of setting up an elevation of one of the bays of an octagonal dome and is taken from Gibbs's book. The portion of the figure lettered "A" gives the means of forming the outline of the bay in elevation, while Fig. 2 B shows the elevation of panels upon it. In Fig. 2 A the two triangles shown below the section and elevation may be regarded as merely constructional; they represent the projection of one of the eight bays of a dome upon a horizontal plane.

Draw first on the right of the Fig. 2 A an isosceles triangle, the apex of which is at the centre of the dome, its base equal in length to the bay at its springing, and its height equal to half the span of the dome. Vertically above this draw the section of the bay as shown, and divide the quadrant into any number of equal parts. Project these divisions vertically down upon the triangle below and number the points at which they cut it to correspond with those above. Now re-draw the triangle in a vertical position, as shown on the left, and project lines from the numbered points. The intersection of these lines with horizontal lines drawn from the corresponding points on the section give, when joined by a curve, the outline of the bay in elevation.

To form the border, mark off the width selected at the base of the triangle below the elevation, as shown at XA, join the point A with the apex of the triangle, and taking, for convenience, the same

FIG 2B



divisions on the side of the triangle as were used for finding the exterior lines, project up B, C, D, &c., as before; the points at which these lines intersect with the horizontal lines from the section are points on the border in elevation.

The horizontal termination of the border, at the top of the elevation, represents the limit of the central treatment seen in plan on Fig. 2 B.

Fig. 2 B.—This figure shows the method of setting out the panels on the bay illustrated by Fig. 2, A. The general principles involved will be seen to be the same as those already discussed.

In order to avoid confusion in the subdivision of the arc of the section, the panels have been shown upon a separate figure. The two triangles representing the plan shown in the lower half of the figure are identical, one being drawn at right angles to the other: that under the elevation, however, is not necessary for the construction. These triangles and the outlines of the section above are set out as for Fig. 2 A.

Mark off the border A, B, F, G, and divide the intervening space on the base of the triangle into the required number of parts to give the centre lines of the design, as at B, C, D, and intervening points, and connect these points with the apex of the triangle. From the point O on the section, which is the bottom limit of the panels, cut off a length along the arc O1 equal to B C on the plan below. From the point 1 on the section draw vertical projections cutting the lines connecting B and C with the apex of the triangle in *a a*. Transfer this distance *a a* to the section at 1, and thus obtain the length on the arc 1 2. Project from 2 and obtain the distance *b b* on plan, which in its turn gives the length from 2 to 3 on the section. Continue this process until the point 8 on the section is obtained and project horizontally from the points across the elevation to obtain the horizontal positions of the panels. From the centre line of the elevation mark off the distance *a a*, *b b*, *c c*, &c., taken from the plan upon these horizontal lines. Connect the points *a*, *b*, *c*, &c., on elevation by a curved line which gives the upright sub-division for the panels, intermediate centre lines being obtained in the same manner. By drawing lines on the elevation through the intersection of these two sets of guiding lines, the whole space may be mapped out as shown and elaborated by hand as desired.

(To be continued.)

GLAZED MATERIALS FOR LONDON BUILDINGS.

Writing to the "Times," Mr. J. Danvers Power suggests that the new County Hall should be built of glazed material. "On the question of appearance, I will not presume to say much. Perhaps the most prominent illustration of building in glazed ware* is the new part of the Savoy Hotel facing the Strand, but there are many more examples throughout the streets of London, and those who do not admire the colour treatment in every case may be reminded that many varieties are available. Examples of simple glazed brickwork can be seen in two houses, numbers 15 and 17, in Melbury Road, Kensington; while the use of glazed terra-cotta together with glazed brickwork was shown in a remarkable design exhibited in the Academy of 1905 and since carried out in Addison Road.† . . .

"I have made some enquiries on the important subject of cost, and have the best authority for saying that the difference between the cost of ordinary red-brick facing with Portland stone dressings and coloured glazed facings with Carrara ware dressings is 5½ per cent. extra on the facing work only. . . .

"There remains the question of the permanence of materials used in building, and as to this there is, I believe, no doubt that glazed terra-cotta and glazed brickwork can be made as durable and as impervious to the corrosion of London's atmosphere as a glass bottle; whereas neither stone nor marble is able to withstand disintegration from the acids in the air. . . ."

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*Doulton's Carrara.

†By **Mr. Halsey Ricardo.**

COMPETITION FOR NEW SECONDARY SCHOOLS, BISHOP AUCKLAND.

Conditions.

The following is a summary of the conditions of the competition for new secondary schools to be erected at Bishop Auckland by the Durham County Council:—

The architect whose plans are selected by the Committee and approved by Board of Education will be employed to carry out the work, provided satisfactory evidence is given as to his experience and capability. Commission 5 per cent. on builder's contract, exclusive of furniture; such commission to include preparation of plans and specifications, revising same (if necessary), preparing copies of plans for L.G.B. and local authority, making working drawings, sketch plans, estimates, granting certificates, and attendance on committees, interviews, correspondence, examining and passing accounts, supervising work, travelling and all other out-of-pocket expenses. No commission on "extras" unless orders countersigned by chairman of County Higher Education Sub-Committee.

Premiums of £20 and £10 for second and third premiated designs respectively.

Plan of site will be furnished, showing levels and adjoining streets, also position and levels of existing sewers, if any.

Foundations taken 3ft. below ground-floor level.

Accommodation and approximate size of the rooms as follows:—

SCIENCE BLOCK (accessible separately from girls' and boys' schools).

	Ft. super. floor area.
Elementary chemistry and physics laboratory	900
Two advanced chemistry and physics laboratories, each	450
Balance-room	150
Lecture-room	900
Preparation-room	150
Store-room.	

GIRLS' SCHOOL (for 250 with power of enlargement to about 400).

Four classrooms, each to seat 25.
Five " " 30.

	Ft. of floor space.
Assembly-room and examination hall	1500
Two teachers' rooms (with lavatory and W.C. contiguous), one	200
another	350
Dinner-room to accommodate 100, with kitchen attached	250
Drinking fountain, central, near hall.	
Bicycle shed and place for storing implements for games.	

Boys' school will not be built at present, but a future boys' school having the same accommodation as the girls' school should be shown in block only.

Boys' and girls' schools must be planned so as to be capable of easy extension.

The school must be in conformity with the last building regulations for secondary schools of the Board of Education, and illustrated by the following drawings:—

(*a*) Block plan of site, 20ft. to 1in., showing positions of buildings, playgrounds and drains.

(*b*) Plan of each floor and of the roof, 8ft. to 1in., showing internal fittings, desks and fireplaces.

(*c*) Two sections and four elevations, 8ft. to 1in., showing ceilings and position of window heads in relation thereto, and mode of ventilation.

(*d*) Detailed drawings and perspective views not admitted.

Drawings to be accompanied by:—(1) Description of buildings; (2) short specification of materials to be used; (3) cubic contents of buildings and estimate of cost.

A stone building of simple, dignified character, free from ornamentation, is desired, but competitors are free to suggest other treatments.

Special consideration will be given to well-considered plans which can be carried out at a small cost, and to those which place the greatest number of classrooms on the level of the hall.

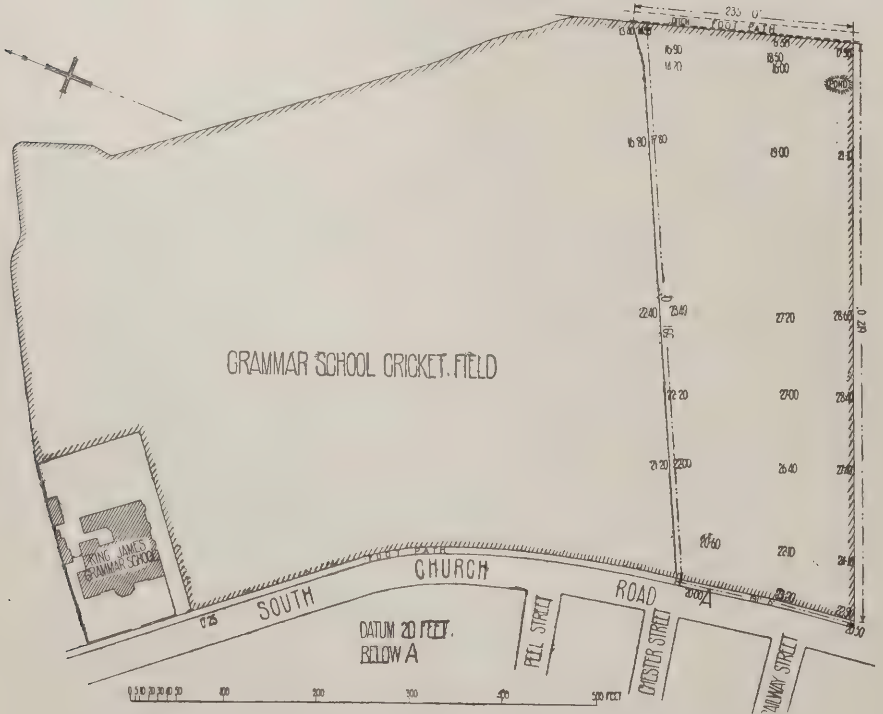
The architect must supply full particulars of drainage system and water supply available, and ⅛th scale plan of drainage system as actually carried out.

If a suitable tender cannot be obtained from a responsible builder within 7½ per cent. of the competitor's estimate, the Committee may, if they think fit, without any remuneration to the competitor, engage the services of another architect, or select the design of another competitor.

Enquiries about foregoing conditions to be made on or before January 25th.

Designs to be delivered, carriage paid, at County Education Offices, addressed "Secretary for Higher Education, Shire Hall, Durham," not later than noon on Friday, March 15th.

Assessor: Mr. E. R. Robson, F.R.I.B.A.



COMPETITION FOR SECONDARY SCHOOLS, BISHOP AUCKLAND: SITE PLAN.

Notes on Competitions

Some misunderstanding may have arisen in connection with a statement which was inadvertently made in these columns a fortnight ago under the heading of "Assessing"—namely, that a nomination made by the president of the Institute was accompanied—when sent to the promoters of a certain competition—by an intimation that the assessor's fee would be fifty guineas. The subject, it will be remembered, was a small competition for a building of a value of about £1,500, and it was urged that such a fee was absurd and out of all proportion to the labour involved. Of course, the president does nothing more than make his nomination; the fee is a matter of arrangement between his nominee and the promoters. In this case the promoters could see no reason for incurring a fee which amounted to two-thirds of that payable to the successful competitor, and as they and the president's nominee were unable to come to terms the competition—so it has since been ascertained—was abandoned. The fact remains that if all competitions are to have assessors, fees must be proportioned to the value of the building, otherwise no credit can accrue to an Institute whose president's nominees are not amenable to reason. There is no doubt that if assessing is to be conducted successfully it must be treated as a science and applied in accordance with a well-considered method, which should be rarely, if ever, departed from. It is evident that a large number of assessors lack a knowledge of even the most elementary principles of the science. Since the duty of nomination has become vested in the president, it should also be his duty to ascertain whether his nominee really possesses the necessary qualifications and that it is his intention to act to the credit of the Institute. The Competitions Committee could well employ some of their time by drawing up a set of regulations for the guidance of assessors. Mr. H. W. Wills touched upon a point at the last business meeting of the Institute which has caused confusion in more than one competition. His motion—happily carried—that "This meeting considers that the assessor in a competition should refrain from any expression of doubt as to the relative merits of the designs placed in his award, such expression of doubt being calculated to weaken the effect of his award and to lead the promoters to override it, to the great detriment of the object aimed at—namely, the adoption of the best design," forms a clause which might be adopted almost word for word in a set of regulations such as those suggested. The business meeting in question constituted a competition evening, and in regard to Mr. Gammell's resolution, "That this Institute exert its influence in obtaining the abolition of the growing custom of penalising non-competing architects by retaining their deposit," it may be observed that all architects who compete have suffered at one time or another from this special form of promoters' tyranny. The Institute has been requested from time to time to deal with the matter, but, so far as is known, has done nothing. It has now resolved to "exert its influence," and the Competitions Committee is provided with another subject through which it may justify its comatose existence.

The Question of Deposits.

It is becoming an increasing grievance among architects that in most competitions they should be required to pay a deposit in order to obtain the conditions. This is a very unsatisfactory matter, and we were glad therefore to see it brought before the last business meeting of the Institute. We have made several attempts to obtain conditions of competition for publication in our columns, but have experienced very considerable difficulty, promoters being very much disinclined to oblige, though it is obvious that in their own interests the greater publicity given to the competition the more designs likely to be submitted, and the better selection for the promoters. However, this week we are able to give a summary of the conditions in the competition for new secondary schools at Bishop Auckland, and we hope that on future occasions with other competitions we may be able to do the same.

The Peace Palace.

The six premiated designs for the Peace Palace at The Hague, together with 40 other designs for the building, are about to be issued under the auspices of the Society for the Advancement of Architecture in the Netherlands. There will be editions in several languages. The edition for the United Kingdom and The British Colonies has been entrusted to Messrs. T. C. & E. C. Jack, of Edinburgh. In all there will be 76 plates, together with descriptive letterpress. The work is divided into eight parts, price 10s. 6d. nett per part, and will be completed this year. The plates measure 14½ins. by 19ins. The English designs shown are those by Mr. John Belcher, Mr. Henry T. Hare, Messrs. Russell and Cooper, Messrs. Wills and Anderson and H. W. Cotman, Mr. John F. Groll, and Mr. I. Coates Carter.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
Jan. 19	LIBRARY AT PLYMOUTH.—Premiums £50, £30 and £20. MUSEUM AND ART GALLERY AT PLYMOUTH. Premiums £25, £20 and £10. Limited to local architects. Particulars from Borough Librarian, Plymouth.
Jan. 19	COUNCIL SCHOOL AT GORTON.—Limited competition. Applications by this date to W. A. Clegg, Education Office, Town Hall, Gorton, Manchester.
Jan. 31	TWO BRANCH LIBRARIES AT SUNDERLAND.—Limited to local architects. Premiums £20 and £10 for each library. Particulars from John W. Moncur, borough engineer, Town Hall, Sunderland.
Feb. 1	CHILDREN'S HOSPITAL AT SUNDERLAND.—Premiums of £100, £50 and £25. Particulars from T. Robinson, secretary, Infirmary Offices, Bank Buildings, Sunderland. Deposit £1 1s.
Feb. 6	FEVER HOSPITAL AT GALWAY.—Premium £25. Particulars from R. F. Mullery, clerk to the Board of Guardians, Galway.
Feb. 16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
March 3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25. Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford. Yorks. Deposit 10s. 6d.
March 15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham.

Wilfrid Lawson Memorial.

The competition among sculptors for a drinking fountain to be erected to the memory of the late Sir Wilfrid Lawson at Aspatria, Cumberland—his birthplace—has been decided in favour of Mr. L. Fritz Roselieb, of London, S.W. Forty-two models and designs were submitted, the selection having been made by Lord Carlisle and the committee in charge of the matter. The fountain will be 20ft. high, with a figure of St. George and the Dragon on the base, and portrait panels of the late distinguished temperance reformer.

Our Plates

We publish this week four working drawings of a house in course of erection at Exmouth, of which Mr. W. H. Ansell, A.R.I.B.A., is the architect, and Messrs. Dart & Francis, of Crediton, are the builders. These working drawings are reproduced from the half-inch details with the idea that they may interest our readers. The printing on some of the plans is not the same as on the originals, as the necessity of reduction would have caused the printing on the original to be unintelligible.

A new Chimney Pot.—Messrs. Mark Fawcett & Co., of 50, Queen Anne's Gate, London, S.W., the well-known specialists in fire-resisting floor construction, have just placed a new down-draught-preventing chimney pot on the market which they call the "Edwardian." The pot has been well tried in difficult circumstances and has achieved success on all occasions. It is made of terra-cotta in one piece. The form of the pot is extremely happy, whereas the majority of pots placed on the market are an eyesore. We shall deal with this pot in further detail at a later date.

Calendars and Diaries.—We have received a neat little calendar from Messrs. Robert Boyle & Son, of 64, Holborn Viaduct, London, E.C., consisting of a small sheet of celluloid upon which is printed the calendar, together with a scale along the edge. A pocket book with calendar and postal information, &c., is being issued by Messrs. Pinchin, Johnson & Co., Ltd., of 23, 24 and 25, Billiter Street, London, E.C., advertising their "Minerva" paint, the memoranda pages consisting of square-ruled paper, which should always be provided in notebooks intended for architects. Messrs. James Duthrie & Co., the sole agents for "Duresco" in Scotland and Ireland, whose address is 129, St. Vincent Street, Glasgow, issue a well-got-up calendar, having separate sheets for each month fixed to a card upon which is a reproduction in colour of a room decorated with this well-known water paint. Messrs. Braby, of Petershill Road, Glasgow, have issued a diary and calendar which is a novelty in so far that it is for one month only. This diary also forms a price list and catalogue of Messrs. Braby's various goods, and provides useful information in regard to standard wire gauges, corrugated sheets, nails, hoop iron, &c. A neat calendar published by Messrs. Mark Fawcett & Co., of 50, Queen Anne's Gate, Westminster, is also a novelty in that tapes are provided which can be pulled down over the face of the calendar so as to obscure the dates which have expired.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.
The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.
Correspondents are particularly requested to be as brief as possible.
The querist's name and address must always be given, not necessarily for publication.

Adjoining Owners: a Chimney Nuisance.

BUILDER writes: "Twelve months ago I erected houses on a plot of land, and a few weeks ago the adjoining landowner built up to my property. He has erected a chimney immediately behind one of mine, exactly the same width, but has carried it several feet higher, interfering with the draught and creating a thorough nuisance by making my chimney smoke badly. Can I compel him either to raise my chimney to his own height or take his own down to my height?"

I fear that, annoying though his action may be, you have no legal remedy against your neighbour. He had the same right to build as he chose as you had, and I can only suggest that you should raise your chimney to an equal height to that on the adjoining property. F. S. I.

Dilapidations: Are Ceiling Joists "Main Timbers"?

X. writes: "Under the conditions of a lease the lessor agrees to keep in repair the whole of the main timbers, main walls and exterior of certain premises, the lessee agreeing to do all repairs and to make good all defects that may occur, other than those for which the lessor is liable, and where defects are caused by defective main timbers. A plaster ceiling has fallen down. The lessee, acting on the advice of his surveyor, says he is not liable to make good this defect, as it was caused by the ceiling joists (which he says are main timbers) being rotten. The lessor, acting on the advice of his surveyor, says that the lessee is liable, as the ceiling joists are not main timbers. I should like an opinion as to whether or not ceiling joists come under the head generally of main timbers, also as to who is liable for the repair, and the distinction between main walls and walls that are not main walls. Has the question of what are main timbers ever been settled in the Law Courts; if so, in what case or cases?"

Though it is not at all legally clear whether floor joists are "main timbers" or not, there is little doubt that ceiling joists are not included in that description. It is not absolutely essential that one should have a ceiling at all in one's house! I am of opinion that, under the circumstances quoted, the lessee is liable for the repair of ceiling joists, and I should define "main walls" as those external and necessary for the exclusion of the elements (including party walls) together with those necessary for the stability of the structure. I regret I cannot give a reference to any decided cases on this particular point. The case of *Manchester Bonded Warehouse Co. v. Carr* (5 C.P.D. 213) decides that iron beams are legally "main timbers," and it has been held in another case that a "party wall" is a "main wall."

F. S. I.

Rolled Joist Questions at Examinations.

CARDIFF.—S.H.L. writes: "Referring to Prof. Adams's reply to my enquiry in your issue for December 12th, the method he suggests is evidently not one to cover all cases. Take, for example. a joist with a span of 18ft. and a distributed load of 15 tons.

$$\text{BM}=\frac{15\times18}{8}=33{\cdot}75\text{ ft.-tons, } d=\frac{33{\cdot}75}{2}$$
$$=16{\cdot}75\text{, or say 17ins.}$$
$$\text{A}=\frac{33{\cdot}75}{{\cdot}78\times17}=2{\cdot}54\text{ area of flange.}$$

The next paragraph, 'if breadth of flange equals six times the thickness,' is not quite clear. However, assuming for this example that it is so, then—

$$\sqrt{\frac{2{\cdot}54}{6}}=\sqrt{{\cdot}423}={\cdot}65$$

width $\therefore={\cdot}65\times6=3{\cdot}9$, say 4ins. × $\frac{5}{8}$in.
weight per foot $=2{\cdot}54\times12=30{\cdot}48$lbs.

We have, therefore, a joist $17\times4\times30{\cdot}48$ lbs., a section which is not rolled. Hence we have to choose either an $18\times7\times75$lbs. or a $16\times6\times62$lbs., both of which are too heavy. By the usual method we should get BM $=33{\cdot}75\times12=405$ in.-tons, allowing a flange stress of 9·36 tons per square in., which is the equivalent of ·78 in the formula above. We have a moment of resistance of $\frac{405}{9{\cdot}36}=43{\cdot}2$, so that a $12\times6\times44$lbs. joist is amply strong and gives a depth equal to $\frac{1}{18}$ of the span, which is not unusual."

All empirical rules, and particularly "short cuts," must be used with judgment. They are very often found in practice to apply only to the cases analysed. The ratio $d=\frac{1}{2}\text{M}$, given in the previous reply, was based upon what appeared to be reasonable grounds, but the illustration of its use given above shows that it requires modification. Probably $d=2\sqrt{\text{M}}$ will be found much more suitable to general cases. Applying this to the case of 15 tons on 18ft. span, $d=2\sqrt{\text{M}}=2\times\sqrt{\frac{18\times15}{8}}$ $=2\times\sqrt{33{\cdot}75}=2\times5{\cdot}8=11{\cdot}6$, say 12ins. deep. Then $a=\frac{33{\cdot}75}{{\cdot}78\times12}=3{\cdot}6$ sq. ins. area of flange. Then $\sqrt{\frac{3{\cdot}6}{6}}=\sqrt{0{\cdot}6}=$ say 0·8, and width $=6\times0{\cdot}8=4{\cdot}8$, say 5ins. × $\frac{3}{4}$in., and weight per foot $=3{\cdot}6\times12=43{\cdot}2$, say 43lbs. The section will then be 12ins. by 5ins. by 43lbs., or the nearest section, B.S.B. 21, 12ins. by 6ins. by 44lbs. Applied to the example at p. 297, this modified formula gives an identical result. Applied to the example at p. 91, $d=2\sqrt{18{\cdot}75}$ $=8{\cdot}66$, say 9ins., $a=\frac{18{\cdot}75}{{\cdot}78\times9}=2{\cdot}76$ sq. ins. area of flange. Then $\sqrt{\frac{2{\cdot}67}{6}}=\sqrt{0{\cdot}44}=$ 0·66. Therefore, width $=6\times0{\cdot}66=4{\cdot}0$ $=$ 4ins. by $\frac{11}{16}$in. Weight $=2{\cdot}67\times12=$ 32·04, say 32lbs., and the section will be 9ins. by 4 ins. by 32lbs., or say B.S.B. 17 =10ins. by 5ins. by 30lbs.

HENRY ADAMS.

Cutting off a Drain.

NETHERTON.—J. G. V. writes: "A friend of mine, having purchased a piece of land for the purpose of erecting a shop and dwelling-house, finds there is a drain (at present only used for waste and surface water) running under the cellar floor (about 18ins. below), which carries the water from the adjoining property to the main sewer. There is no right of drainage reserved in the deeds. My friend served a notice to the owners of the adjoining property to have same removed and the course altered, as being insanitary and rendering the building unfit for occupation, and in lieu of them doing so he would cut same off on his boundary. He has received a notice to the effect that if he interferes with the drain he will be held responsible. Kindly advise."

Your friend must certainly not cut the drain; if he does so, he will not only be obliged to make it good again, but he will also be liable for any damage that may be caused by its removal or stoppage. The fact that no right of drainage was reserved in the deeds makes no difference; the purchaser bought this piece of land *just as it stood* and subject to all rights and easements to which it was subject, and he must accordingly now abide by his bargain (unless, indeed, he can show that the existence of this drain was *fraudulently* concealed). It is, however, quite possible that your friend could object to the drain being used, at any future time, for any other purpose than that for which it was employed at the time of purchase. I would suggest that the proper way out of the difficulty is that the parties should agree that the direction of the drain be diverted, so that it be made to run through the passage-way you mark on your sketch as "entrance to three houses." Z.

Book on Bungalows, Cottages, &c.

S. writes: "Are there any books or papers on bungalows, cottages or lodges of artistic design from £200: also of cottages at Letchworth?"

"Cottages and Week-End Houses" (Cassell & Co.), price 5s. nett. The Letchworth cottages were illustrated in THE BUILDERS' JOURNAL.

Reconstructing Roof of Projecting Shop.

LONDON.—SUBSCRIBER writes: "Who should bear the expense (landlord or tenant) for the reconstruction of a roof of projecting shop to comply with the new Building Act, when a repairing agreement exists?"

It is quite impossible to give a satisfactory answer to this question without reference to the actual wording of the lease, and I suggest that you should submit that document to your solicitor. If it be a lease with full repairing covenants the expense even of reconstruction (under such circumstances) would fall upon the lessee. The case of *Foulger v. Arding*, tried in the Court of Appeal on March 12th, 1902, will probably prove interesting to you. A report will be found in the "Estates Gazette" of March 15th, 1902.

Z.

"Decorative Contracts."—Under this title Messrs. Waring & Gillow, Ltd., of Oxford Street, W., have issued an artistically-designed volume containing particulars of some of the important contract work which they have carried out in this country and abroad. The selection has been made with the object of showing that Messrs. Waring are not only furnishers and decorators, but that they are in a position to build, furnish, decorate, and equip, down to the smallest requisite, any kind of building and for any sort of residential or official purpose.

THE ARCHITECTURAL ASSOCIATION.

Mr. Temple Moore on Modern Churches.

A meeting of the Architectural Association was held on Friday evening at 18, Tufton Street, Westminster, the chair being occupied by Mr. Walter Cave, vice-president.

It was announced that Mr. E. L. Hunot had been elected a member of the Association, that Mr. T. T. G. Donaldson Selby had been reinstated, and that Mr. Francis R. Taylor had been awarded a prize of three guineas in connection with the A.A. photographic competition.

The chairman stated that Mr. R. S. Balfour, their president, was making as satisfactory progress as might be expected towards recovery from his illness.

Mr. Temple Moore then read a paper on "The Arrangement and Design of Modern Churches." He said :—

In speaking of the arrangement and design of modern English churches, I am assuming that the building is in the Gothic manner, for whatever may be the merits of revived modern British Classic, which appears for the present to hold the field so far as civil architecture is concerned, I trust that we are not likely to return to more or less skilfully applied arrangements of the five Orders for our ecclesiastical buildings.

For one reason, whatever may be the case with our civil buildings, the strictest economy is in most instances a necessity in the ordinary course of modern church building, consistent with a substantial structure, and I believe that

well-understood Gothic

may be so handled that a good architectural effect can be produced in the simplest way, without having to depend on applied architectural ornaments.

Of course I do not mean to say that the style in which a building may be designed has anything to do with its suitability or convenience, which is entirely a matter of planning and general arrangement; but, on the other hand, one often hears it asserted that such and such a style is quite unsuited to modern requirements, as if the sections of the base moulds or the door and window jambs could in any way affect the convenience or suitability of the building. It is no doubt true that the ordinary modern church possesses as a rule very little of either beauty or interest; and is also often far from satisfactory in general arrangement. I think that the cause of this has often been that the designers of these buildings have had little first-hand knowledge of the proper treatment of their subject, and possibly have taken little interest or pains in the matter, so that it is not fair to lay these failures at the door of the style, nor to suppose that had all the caps been Corinthian or Doric the buildings in question would have been one whit better than they are.

The common type of Modern Church,

with a nave divided into comparatively narrow bays with low lean-to aisles, a clearstory with a very high pitched main open roof, a chancel generally lower than the nave, and divided from it by a heavy chancel arch, with the end of one aisle filled up by a vestry, and the other by an organ chamber, on either side of the chancel, is probably as unsuitable a type as could have been selected for a large congregation. It has been repeated over and over again during the last 40 years, and though one now frequently sees departures from it in the better modern work, it is still a type far too prevalent.

How such a plan came to be so general I cannot say. I suppose it has a certain element of cheapness, and somehow got recognised as the correct thing for a church. It is curious that the elder Pugin, who was practically the pioneer in Revived Gothic, generally avoided this defective plan, and it is interesting to cite his churches at Birmingham and Derby, as well as St. George's, Southwark, as excellent examples of planning, suitable to modern requirements.

In speaking of the arrangement of a modern church, let us take the average size of a building suitable to a modern town parish, a building capable of accommodating, say, 600 to 900 people.

Influence of Site on Plan.

The first question that should be always considered in laying down the plan is the site. One of the greatest faults in modern work is that this question of the site is not nearly so carefully considered as it should be; buildings looking when they are finished as if they had nothing to do with the place they happen to be in.

Generally, the plan of such a church as I am speaking of will probably resolve itself into a nave with aisles on either side; and I consider that this is often the best plan to be adopted; but it is important to remember that in a church where practically the whole space, excepting the choir, is to be occupied by the congregation, it is well to make the aisles, and the arches separating them from the central nave, as wide and spacious as possible, as a few large pillars do not cut up the interior in the same degree as a greater number of smaller ones do. It is also important to carry the aisles eastward, beyond the commencement of the chancel, to at least within one bay of the east end; as this opens the whole of the choir to the nave and aisles.

A plan on these lines looks, of course, very square on paper, but this is by no means a defect from a practical point of view, as the congregation are more together than in a long and narrow building.

The Choir and Sanctuary.

In the English Church the surpliced choir, though often much abused, has practically become a fixed institution, and this being so, it is of the greatest importance that proper and ample space should be provided for it. This, unfortunately generally—I suppose, from motives of economy—is rarely done in an efficient manner, and churches are disfigured by filling the choir with rows of what are really nothing but pews placed lengthwise, and with quite an insufficient central space between the front desks. There should, of course, be not more than two rows of stalls on either side of the chancel, and the longer the rows are, the better the effect.

With regard to the sanctuary, here again it is of the utmost importance to provide ample space, especially in length, as without this no dignity of effect can be obtained. Steps should be kept low and broad, and arranged as far as possible in groups, so as to give wide platforms in front of the altar, and between the communion rail and the stalls.

A few years ago it was the fashion to very much exaggerate the elevation of the choir and altar; and latterly the tendency has been rather to the other extreme.

I think myself that for a church such as I am speaking of, an elevation of seven or eight steps from the nave up to the altar would be quite sufficient.

The Organ

is another important consideration. The modern instrument, as a rule, has become so large that it is often a great difficulty to provide for it. It is fatal to the internal effect of the building to block up the end of one of the choir aisles with the organ. Probably a chamber projecting from the aisles is, generally speaking, the best plan, but it is essential that there should be plenty of height, and that the front should be as open as possible. Sometimes it is possible to arrange for the organ over the vestries, and where this is practicable it is probably as good a plan as any.

The rules laid down by the Ecclesiastical Commissioners and the Incorporated Church Building Society are, of course, useful as a guide for the spacing of seats, widths of passages, &c. These rules lay down quite the minimum space which should be allowed for these purposes, and in my opinion rather more space should, where possible, be allowed.

With regard to towers and spires, these are probably in most cases better omitted in a town church, unless there is some prospect of enough money to build them of sufficient size without stinting the rest of the building.

Planning.

Returning to the question of general plan, where the site happens to be long and narrow, probably a single span, with comparatively narrow side aisles or passage ways, is the best solution; but it must be remembered that a building of this type requires considerable height to the wall-plate in proportion to the clear width, if a good internal effect is to be obtained. A proportion something after the manner of a covered railway station is certain to be unsatisfactory.

Another very simple and practical plan, which might be much more frequently adopted than it is, especially where economy has to be considered, is a nave and chancel of fair width, with an aisle on one side only, of about the same width and height. The 17th-century Church of St. John, Leeds, is a good example (though wanting in internal height) of how well a church of this type may look.

Having settled the main lines of the general plan, the next question is

The Section,

and this again is a matter that is largely governed by the question of cost. Generally speaking the higher, in reason, the wall-plate can be, the finer will be the effect internally.

I do not think myself that much internal effect is gained by a very high pitched open roof, which is also likely to have practical disadvantages, both acoustically, and for purposes of warming and ventilation. The real proportion of the building is practically settled by the height of the walls, though the proportion may be completed, so to speak, by the total height to the highest point of the internal ceiling, which may be of barrel or other form. Of course there is no internal roof for a Gothic building equal to a stone or brick groined vault, but this is a very expensive method, and I am rather confining myself at present to what may be done in ordinary cases.

Where only a moderate height to the wall-plate is possible, it is, I think, better not to attempt a clearstory, but to carry the nave arcades up to the full height. If the aisle, or aisles, are of about the same width as the nave, they can be similarly roofed; and the aisle walls in this case being the same height as the nave, the side windows can be kept well up, so as to thoroughly light the interior.

Where the plan is arranged for narrower aisles than the type I have been describing, these may be roofed with flat or lean-to roofs; but in this latter case it will be generally found advisable to increase the height of the nave wall-plate, as otherwise the aisle walls will be too low to allow sufficient elevation to be given to the windows; the result being that the interior will be badly lighted.

Where, however, you can get a height of 25ft. to 30ft. to the aisle wall-plate, and about 35ft. to the nave wall-plate, the difficulty I have mentioned will not occur, and you will have sufficient height in the nave to have a really stately arcade. Of course **the Lighting from a Clearstory** which is at all well designed is always very fine; but it should be remembered that the building being intended to be used altogether, the effect of the interior should be a spacious whole; this effect will be lost if the arcades are robbed for the sake of the clearstory, and the aisles thus become, as it were, subsidiary buildings to the nave. This is a perfectly right and proper treatment in certain cases, but not one to be aimed at in a building that should, I consider, be designed to be used as a whole.

I think as a rule it is better in a modern church, such as I am speaking of, to **omit the Chancel Arch altogether,** and to carry the building at one height through from end to end, because the large piers of the chancel arch tend to obstruct the view from the aisles into the choir, though there are cases where a building has to be carried out in sections where the structural division between the nave and choir may be highly desirable. Of course this feature is the general rule in our ancient parish churches, though there are plenty of exceptions to it, such as St. Peter, Mancroft, Norwich, and many others. It is also to be remembered, as regards the chancel arch, that its upper part was very often practically entirely covered by the great rood loft, and rood, with the space behind the rood filled in with boarding, on which was generally a painting of the Last Judgment. This, no doubt, would have a very fine architectural effect, but it is one that is rarely possible under modern conditions.

Where a chancel arch is introduced, I feel myself that the choir wants to be of very considerable length. The ordinary modern custom of making it equal in length to two bays of the nave, and separated from the latter by an arch, *never* to my mind can give a satisfactory architectural result; it only unnecessarily cuts up and confuses the interior.

Windows.

As to windows, the question is rather a difficult one in the present day, when as a rule it is not easy to get them filled with good stained glass. The great point, I think, is to keep the side windows as high up as possible in the walls, and this, of course, is the advantage of a clearstory; but where the clearstory is lacking, a fine effect may be obtained by the proper arrangement of the west windows. The effect of the light coming in from a good height in the west wall, has often as good a result as that from the clearstory. As to **the Arrangement of the East Window,** the large window traditional to English Gothic work is a splendid thing when well designed, but it is certainly not satisfactory without its stained glass. This is rarely now put in when a church is built, with the result that the effect possibly of a really well-designed window can often hardly be seen on account of the glare through the white glass. On the other hand, the east wall, which is, of course, the most conspicuous internal feature of the church, requires a good deal of breaking up, and I think that a grouping of windows with large piers between them would often give a better result than one very large window, especially where the stained glass has to be left to the future.

The proportion and detail of the piers and arches is another matter of the greatest importance.

The Chapel.

A chapel with a second altar is a very usual feature in modern churches, and, where properly managed, adds much to the interest of the interior. It is generally placed on one side of the choir, as a sort of pendant to the vestry and organ chamber, but I do not consider that this always is the best or only position possible. Where there is sufficient length in the site, the chapel might very well be placed to the east of the end of the choir; this would have the advantage of adding to the apparent length of the building, and the effect of the high altar is always more dignified if it is not placed immediately against the end wall of the church. The chapel (or chapels) should, however, properly speaking be always enclosed with suitable screen work.

The Exterior.

With regard to the exterior, I think it will generally be found that where the plan and sections have been carefully thought out, the external elevations will, as a rule, come into shape without any great difficulty. I am certain that it is a mistake, generally speaking, to start with some fixed notion as to the external appearance and then try to fit the interior to it. A building in the Gothic manner should, if it is to be successful, be designed from the inside outwards.

Materials.

Great attention should be given to the proper use of materials. A good design may easily be reduced to a very dull level in actual work if the modern method of having every stone exactly the same colour and size, and every brick the same colour and so on, is followed.

It has often seemed to me that the apparent ideal of modern stonework is to try and make it look as like as possible to the Portland or Roman cement imitations of stone of 40 or 50 years ago. This also applies to other trades, where, for instance, it is most difficult to get men who should know how to carry out Gothic oak work properly: they cannot forbear the use of sand paper and glue unless they are most carefully watched.

Internal fittings and Furniture.

These, of course, are of great importance to the successful completion. Unfortunately it often happens that gifts are made of fittings and furniture, of metal, woodwork, &c., bought ready-made from the ecclesiastical furniture shops, and these things, as a rule, are of the very worst and poorest description. It is not, however, fair to overlook the fact that furniture and accessories such as I am speaking of, which have been *specially* designed, are often little better so far as their architectural character is concerned, than the ready-made article. Much modern work looks as though it had been founded on some old design of a very much more sumptuous character, and had been thinned and skinned down to meet the available price, with a tendency to disguise ill-designed form by a superfluity of detail. I think myself that **the Reredos** is a feature which is often very greatly overdone. Splendid as our old wall reredoses are, even they, I consider, rather tend to overpower the altar they were intended to adorn, and this defect is even more pronounced in some modern work. The eastern light should, I think, always be visible from the body of the church below the traceried heads of the bays of the chancel screen. The plan of omitting the east window altogether and filling the whole end of the church with reredos is not to be recommended, except, of course, where there are practical difficulties with regard to light. I need hardly say that, whether the reredos is of wood or stone, it should be as a general rule richly gilt and coloured.

The Altar-piece may be entirely treated with hangings, and where this is properly done, probably there is no more suitable or dignified treatment. An exaggerated dossal, however, with its narrow tester, looking rather like a portion of a very big bed, is to my mind to be avoided, and a superfluity of upholstery is undesirable.

Where the chancel can be of considerable length, there is no doubt that **a high Rood Screen** is the greatest possible ornament to the interior, but I think it requires very considerable depth behind it to give it its true value.

The Font should stand in the nave, preferably in the centre near to the western doors. As a rule the font is not now generally given at all a sufficiently prominent position. It should always have a cover. As to **the Pulpit,** as a rule wood is preferable to stone. It requires carefully proportioning as to height in accordance with the size of the building, and may often with advantage have a sounding-board or canopy.

The front of the Organ (it is hardly correct now to speak of an organ case where the instrument is frequently as big as a cottage) can be made to look very well if skilfully treated. There are unfortunately no Gothic examples left in England (there is but one in Wales), though there are some very good 17th-century ones. The illustrations in Hill's book on the organ give a number of Gothic examples from abroad, many of which are most suggestive.

A vote of thanks to Mr. Temple Moore for his interesting paper was proposed by Mr. G. H. Fellowes Prynne, seconded by Mr. Francis Hooper and supported by Mr. Leonard Williams, Mr. Newberry, Mr. Walter Millard and Mr. Walter Cave.

Notes and News

Municipal College of Arts, Edinburgh.—The Prince of Wales will lay the foundation-stone of this building in July.

The Royal Scottish Academy has added Sir Thomas Drew, Mr. Sargent, and M. Rodin to the list of its honorary members.

Change of Address.—Messrs. Chatterton and Couch, AA.R.I.B.A., have removed from 6, Gordon Place, W., to 82, Victoria Street, S.W.

Partnership.—Mr. L. A. Phillips and Mr. J. H. Vaughan have entered into partnership as architects at Provident Chambers, 29, High Street, Newport, Mon., practising under the style of "Phillips and Vaughan."

A Hospital for Infants, the first institution of the kind in Europe for the treatment of children suffering from malnutrition—is being erected in Vincent Square, London, S.W. It will contain fifty cots and accommodation for the nursing staff.

"The Playhouse," Mr. Cyril Maude's new theatre in Northumberland Avenue, which, it will be recollected, was crushed by the fall of the Charing Cross roof in December, 1905, has now been completed, and will be opened on January 28th. The building has been reconstructed by Messrs. Patman & Fotheringham, Ltd., the architects being Messrs. Detmar Blow and Billerey.

Menai Bridge in Danger.—The famous suspension bridge over the Menai Straits is in an insecure condition. It was built by Telford in 1826, in order to complete the mail coach route from London to Holyhead, and for many years was regarded as a triumph of engineering skill. The companion structure, the tubular railway bridge, which also spans the Straits, was built by Stephenson in 1849-50.

Ford Madox Brown's Frescoes in the large hall of Manchester Town Hall, are declared to be showing signs of fading by reason of exposure to the air, and it is urged that they should be covered with glass: as against this, however, the argument is advanced that if the fescoes were glazed they could not be seen properly on account of the reflections caused by the high windows on either side of the hall.

The new Royal Grammar School at Newcastle-on-Tyne was opened last week. It is between Eskdale Terrace and Brandling Fields, Jesmond, and has cost about £60,000. Leicestershire red bricks with Windy Nook stone have been used for the elevations. Messrs. Russell and Cooper, of London, were the architects, their design having been accepted in competition. The contractors were Messrs. Arnold & Son, of Doncaster.

Sir Aston Webb in New York.—Brief newspaper reports are given of the speech of Sir Aston Webb at Washington last week, when acknowledging the gold medal of the American Institute of Architects, of which he is the first recipient. Sir Aston Webb said that a great architectural problem was being worked out in New York in the practical rebuilding of the streets "down town," which promised to rival on a gigantic scale the streets of Genoa and Florence.

Paignton Cottage Hospital has been extensively altered and enlarged, the architects for the work having been Messrs. Bridgman and Bridgman.

The A. A. Students' Smoking Concert will be held on March 1st in the Georgian Hall of the Gaiety Restaurant, when an attempt will be made to revive the A.A. plays by producing a short, new and original musical extravaganza. It has also been arranged to hold a ladies' night and dress rehearsal of the play on the preceding evening at the same place. Particulars can be obtained from Mr. T. W. Watkins, 28, Elm Park Mansions, S.W., and from the secretary of the Architectural Association, 18, Tufton Street, S.W.

Quick Building.—Referring to the erection of Messrs. Kynoch's soap factory near Birmingham in three weeks, and the erection of the large new office building next the Mansion House in 40 weeks by Messrs. Cubitt & Co. (see page 12 of our issue of last week), Messrs. Patman & Fotheringham, Ltd., write pointing out that they built the Coliseum in less than seven months, while in six months they completed the sub-lieutenant's quarters at Whale Island, Portsmouth, for the Admiralty, this building being 256ft. long, 27ft. wide, and 34ft. high, comprising 100 rooms and bathrooms.

"Style in Architectural Draughtsmanship."—A paper with this title was read before last week's meeting of the Liverpool Architectural Society by Mr. Stanley D. Adshead. Mr. Adshead pointed out that when each architect was a craftsman the position of draughtsmanship was subordinate, but in the present day so much depended on draughtsmanship that, if this was not good, English architecture would descend into eccentricity instead of a true national style being evolved. He urged the importance of a sound school of draughtsmanship, and quoted with some approval the French and American methods of teaching.

NEW YEAR SOUVENIRS.

We have received many calendars for 1907 from various firms, but we must single out for special mention a most artistic one which has been sent to us by the Bromsgrove Guild of Applied Arts. This is quite a departure from the usual kind, being embellished with a bronze plaque, beautifully modelled, showing Father Time handing over the World, and below, the figure of a youth, emblematical of the New Year. Readers who desire to secure one of these calendars should write at once to the Bromsgrove Guild.

From the Chloride Electrical Storage Co. we have received a match-box as a useful New Year reminder. Doubtless a similar match-box will find its way into the pockets of many architects, and that assumption prompts us to observe that business houses might more often adopt the same idea of sending out useful souvenirs. Architects and their assistants use so many small articles in their daily occupation, such as compasses, india-rubber, scales, rules, &c., that we think enterprising firms who have hitherto pinned their faith to a calendar might do well to try some of these new means of bringing their names to the notice of professional men.

Correspondence.

An Old Water Main.

To the Editor of The Builders' Journal.

Sir,—In looking over back numbers at the beginning of another year I find in your issue for December 19th that Mr. John R. Lee, of Burnley, records the recent finding of an old water main beneath an ancient Elizabethan building, known as Fulledge House, in that locality. Upon the demolishment of the latter edifice the pipes found are described as consisting of "oak beams bored from end to end and jointed at their ends by socket and spigot of a conical kind." If this description is strictly accurate then they are of an unusual character, but I venture to enquire whether the material is really oak? I have examined hundreds of these old water-pipes, but in every instance have found them to be elm. An example I have in my own possession I personally saw dug out of the middle of the road (with many others) in 1889, immediately opposite to Messrs. W. H. Smith & Son's premises in the Strand, W.C. The specimen is of elm, in section circular—or, to define it accurately, an irregular oval. The wood is left in its original condition and still retains some of the bark. Its extreme diameters are 13ins. by 11ins., whilst the bore is 6ins.—Yours truly,

HARRY HEMS.

Exeter.

"The Matron and the Architect."

To the Editor of The Builders' Journal.

Sir,—I was interested to read in your issue of January 9th a letter from Mr. Saxon Snell stating how in hospital planning he has always found consultation—over matters of detail—with the matron and staff of the hospital of the greatest value and assistance. The experience of every man of tact is the same. And if this is true of hospital planning, it is equally true of the planning of domestic buildings.

The average "matron"—who has had years of experience of managing servants and of running a house, and of the never-ending worries if that house is not conveniently arranged—knows infinitely more about the arrangement of the domestic offices than the average architect, unless the architect happens to be a family man, and is constantly getting his own shortcomings in this direction rubbed into him at home.

These reflections are called forth by the study of a plan of a large house published in your current issue—a plan by a distinguished F.R.I.B.A. and past-president of the A.A.

When we provincials—we small fry of the profession—see a distinguished name on a plan we eagerly scan it, thinking we will find some masterly handling of the problem. The plan referred to is not that of a Letchworth "simple life" cottage, but a house of some pretensions—a "Court"—that will require five or six servants to run it. What do we find? That among other trifles there is no scullery directly off the kitchen, that every time a servant has to fetch coals for the public rooms he or she has to pass through not only the servants' hall, but plumb through the centre of the kitchen, go outside, get wet feet, and on the return journey leave a trail of footprints and coal dust right through the kitchen regions. I leave you, Sir, to picture to yourself the temper of that cook!

It makes one think of the advertisement (paraphrased):—

> Why does the cook at the housemaid scowl so?
> Because of the whims of the Architect oh!

Yours truly,

FOGGED PROVINCIAL.

Protection from Lightning.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—The omission of a word in my letter in your last issue makes me appear to give dangerous advice. The sentence should read: "Those metals which it might be impracticable, or even harmful, to connect should be avoided by carrying the conductor so that it is *not* within sparking distance."—Yours truly,

ALFRED HANDS, F.R.MET.S.

THE TIMBER TRADE IN 1906

The wood trade of 1906 has been a prosperous one for everyone concerned. This prosperity, however, has not been, and is not, consequent on any great demand from the United Kingdom, for in spite of a period of very active general trade, the building trades have seldom been in a worse condition. It was the foreign demand which set the tune during 1906, and bids fair to set it again this year. The higher level of price obtainable has stimulated production, and the large volume of trade for 1906 takes us back to the heavy figures of 1903 for a parallel to the importation into the United Kingdom. Without any corresponding increase in the consumption the stocks in this country have, therefore, been considerably augmented in comparison with what they were at the beginning of 1906. They were then smaller than was at all desirable; they are now doubtless above the average, but they are stocks which are not likely to be replaced at the money they cost.

In London, while markets have been favourable throughout the year, there has been much and justifiable complaint of lack of demand. Week after week, and month after month, the deliveries from the docks have fallen away, and the miserable total eventually attained has no parallel in recent times. In sharp contrast with this the overside deliveries stand out as the largest ever made, but, Messrs. Churchill and Sim observe, "they are an unreliable test of consumption, dependent always on a larger or smaller importation, and, even after giving them full credit, the total of the year's deliveries from all sources remains smaller than we have known for ten years past." Nevertheless, London buyers can look back upon 1906 and join in the general note of thankfulness for a prosperous year.

ESTIMATED CONSUMPTION OF LONDON.

	Deals, Battens, Boards, and Ends.	
1900	55,359,000	Pieces.
1901	60,154,000	,,
1902	60,720,000	,,
1903	59,271,000	,,
1904	57,084,000	,,
1905	57,001,000	,,
1906	55,365,000	,,

DELIVERIES FROM LONDON DOCKS.

	Petersburg Standards. Deals and Battens.		
1900	148,648	48,529	Boards.
1901	185,937	55,976	,,
1902	167,466	57,355	,,
1903	152,380	52,178	,,
1904	143,166	49,290	,,
1905	129,527	47,163	,,
1906	114,978	42,621	,,

DELIVERIES DIRECT FROM SHIP TO CRAFT.

	Deals, Battens, and Boards.	
1900	140,131	P.S.H.
1901	134,367	,,
1902	135,489	,,
1903	146,597	,,
1904	135,644	,,
1905	148,835	,,
1906	154,093	,,

Soft Woods.

Sweden.—The importation of Swedish prepared boards to London was a smaller one than usual during 1906, but the deficiency was fully made up from Norway, and the trade was rather a dragging one throughout the year. The chief difficulty was to get the full extra cost from buyers for the various and complicated forms of matching now so often required. It seems a little unreasonable that shippers should be expected to prepare a specification to meet a buyer's fancy or his special trade, entailing cost for extra machines and extra labour, without being paid for it. At the prices at which battens and other raw material are opening for the new season, however, this will become a more difficult problem than ever, and not only so, but the margin for the cost even of the ordinary planing will require a good deal of manipulation. The Swedish shippers have decided to re-name their classification for this country, turning their mixed, thirds, fourths, &c., into firsts, seconds, thirds, &c., as is already done on the Continent.

Russia.—Russian shippers set their opening prices for 1906 at the extremest verge of what there was any possibility of getting for deals, and although markets afterwards favoured them, and there was never any actual breakdown in free-on-board rates, business was confined and restricted all through the season, and at the end of it the necessary quantity of selling had not been accomplished.

Finland. — The Finnish shipments during 1906 were hampered by every sort of political and labour troubles at the shipping ports, especially round about the period at which the navigation re-opened. The stocks were as usual easily sold, and last year at continuously good and improving prices, mainly to Continental markets. To London the supply of small battens showed no diminution in volume. Prices fluctuated rather more widely than usual, reaching a high zenith in the early autumn, since when they have fallen away in quite disappointing fashion.

Norway.—The Norwegian wood trade floated on the full flood tide of a prosperous year during 1906. The shipments of battens and boards to London were on a larger scale than in either 1904 or 1905, and the results have probably accomplished the difficult task of satisfying both sellers and buyers alike.

Prussia.—Prussian shippers did well with their exportations both of oak and fir timber during 1906. The log supplies in the interior were not so unduly curtailed as was at one time expected, and although prices ruled high, the world demand was equal to them, feeling no pressure of quantity. The import of fir timber to London was unsatisfactory, and what was brought here was not in response to demand so much as to a speculative belief that with the great rise in pitch-pine timber good Danzic fir ought to regain something of its old prestige. This belief is far from having been justified in the result, and the only lesson to be learnt seems to be that (cheap Danzic fir, or cheap Russian larch notwithstanding) what architects and contractors now require in the way of timber is sawn pitch-pine and nothing else.

Canada.—The figures for 1906 again show the extent to which the wood trade between Canada and Great Britain has fallen away. The reason lies still with the unsatisfied and unabating competition both with the home demand of Canada herself and the neighbouring demand of the United States, which continue alike to drive up prices and to curtail supplies.

United States.—At the beginning of the year the market for sawn pitch-pine timber was in a state of nerves at the great rise in prices which had been established in 1905, and although it remained more or less in this condition throughout the past season, that rise has not only been maintained, but a further and very important appreciation in prices has taken place. The importation was again a small one to London, the consumption in the main satisfactory, while the stock, although passably sufficient, is by no means excessive. There was a slight break in the upward course of quotations for arrival in June and July, but it was quickly followed by a fresh forward movement which lasted to the end of the season.

Hard Woods.

Teak.—Business in this market was much hampered throughout 1906 by the professed inability of the shippers to adequately meet the natural requirements from this side, either in respect to quantity, quality or specification. Messrs. Denny, Mott & Dickson report that prices for first-class wood attained an unprecedented level and a large quantity of very inferior timber was shipped and forced on the home market at a price which two or three years back would have been the value of first-class wood. The quality of the timber in the rough has greatly deteriorated during the last few years, the supplies yielding not more than 10 per cent. of first-class timber, as against an average yield during the last decade of about 25 per cent. The volume of business was naturally restricted by the difficulties in the supply, and although 1906 was an exceptionally good year for the rolling-stock industry and a fairly satisfactory one for shipbuilding, nevertheless the consumption of teak fell off more than 10 per cent., as against the consumption of the previous year, and about 28 per cent. off the consumption of ten years ago, since when the class of work requiring a first-class wood like teak has enormously developed. Java is benefiting by the falling off in our Indian teak trade, and although comparing unfavourably with Burma and Siam teak in respect to lengths and texture, it is obtaining a firm footing in the United Kingdom.

Mahogany.—This market was a restricted one owing to the continuous falling off in the imports during recent years. The imports to London during 1906 were practically only two-thirds of the low imports of 1905. The supplies from Honduras showed an important increase and this description was the sheet anchor of the market, as most other descriptions, notably Mexican, Cuban and African, show severe shrinkages in the supplies. The effect of the small import was a steady maintenance of price throughout the year, notwithstanding the dragging market caused by the uncertain supplies.

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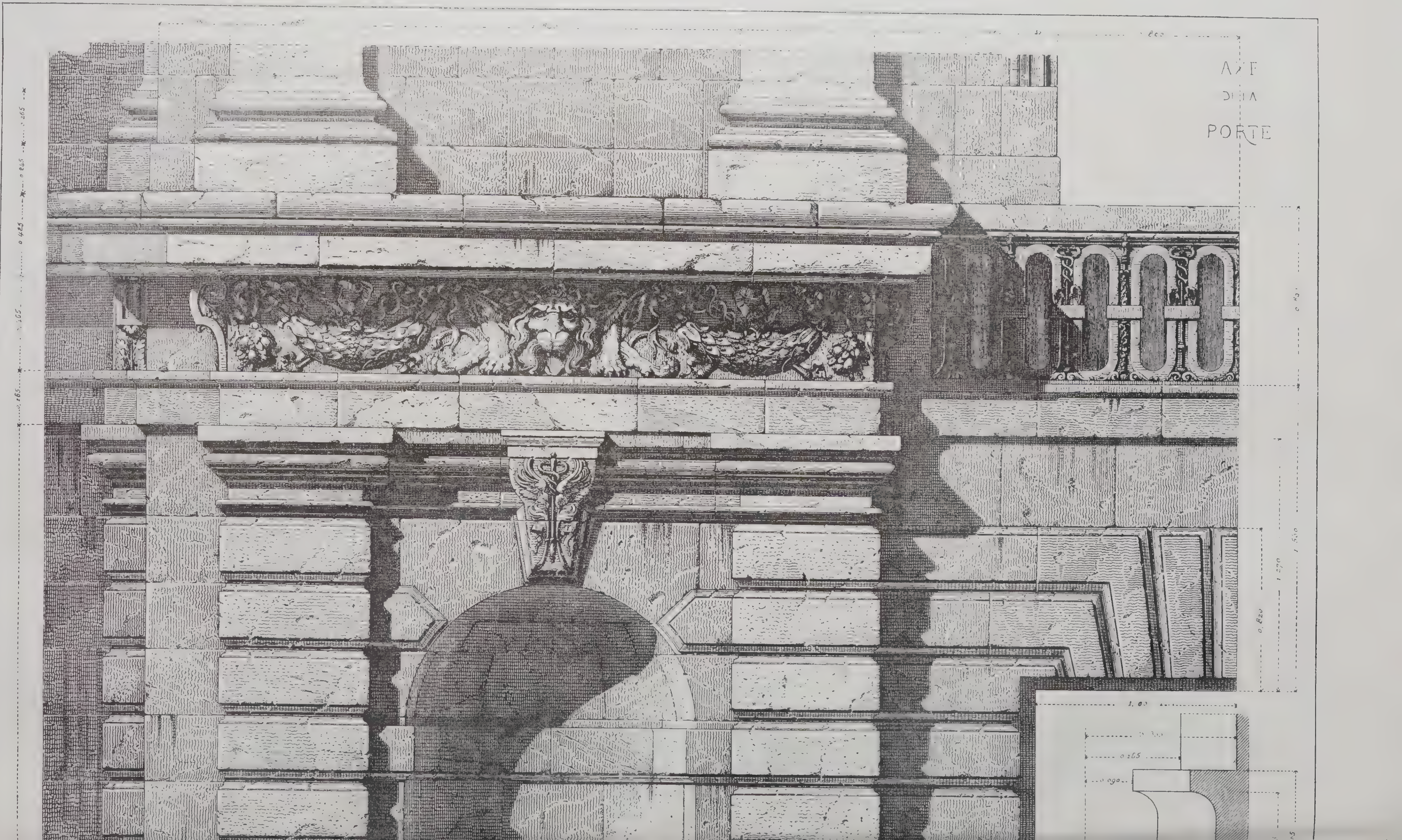

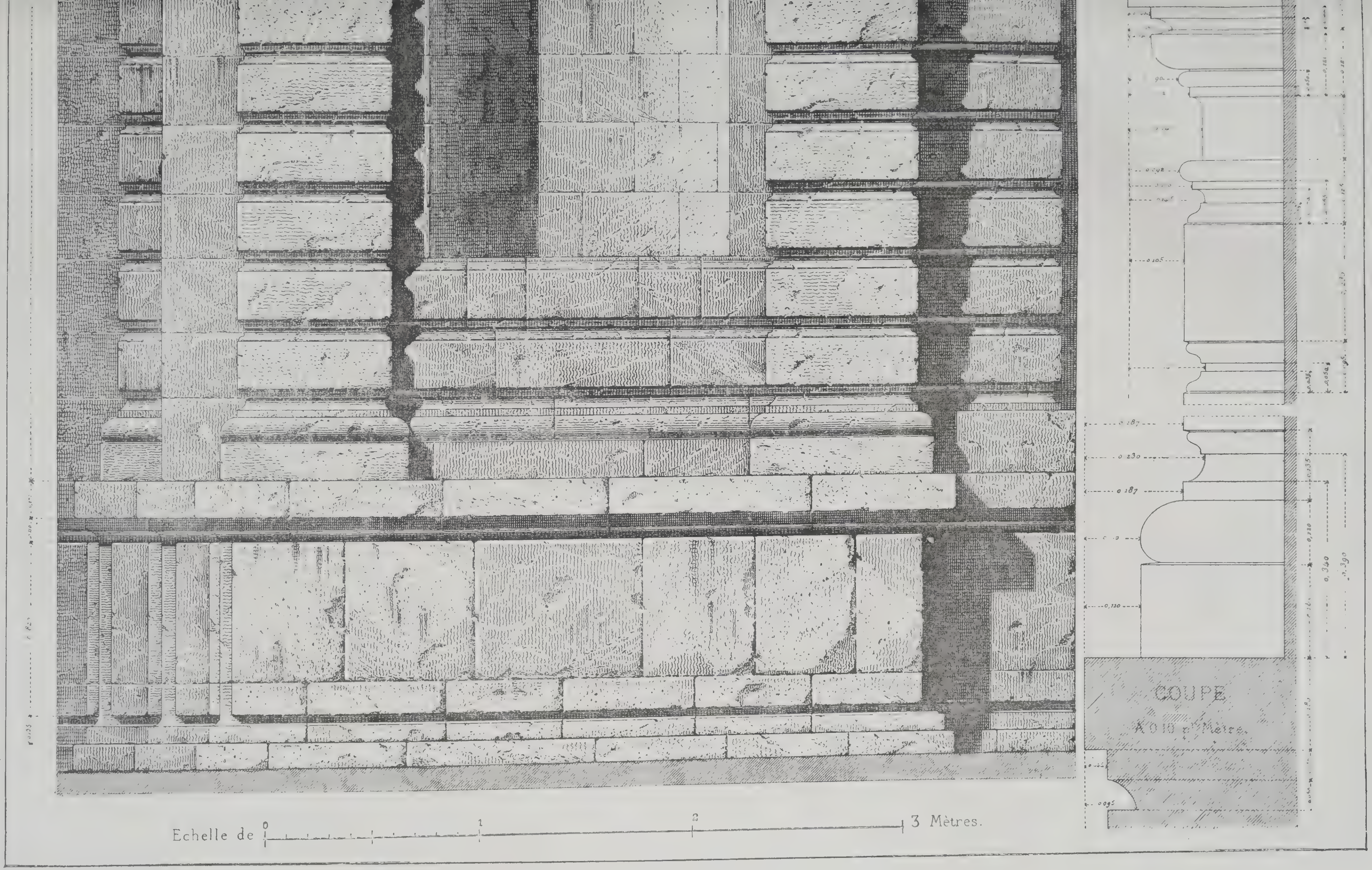

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THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

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The Architect and the Specialist. THE problems entailed in the design of buildings become more and more complex every year, and the architect is required to give more and more service. Obviously this service is not to be rendered for nothing, and we would enquire upon whom the work falls and how the remuneration is secured. The crux of the matter lies in the specialist work. Suppose, for argument, we take steelwork, ventilation, heating, lighting, and plumbing. The architect seldom provides the working drawings for these. He merely indicates them on his drawings; the actual detailing being done by firms competing for the work. Often several sets of plans are provided when one only can be accepted. Who is to pay for the time wasted? Obviously the firms losing the contract must charge the cost as a percentage upon other jobs, and eventually the building owner has to meet the expense. The building owner might argue that he was paying the architect to perform this service; that 5 per cent. on the cost of a building was considered sufficient by architects in the United States in order to remunerate them for the expense they were put to in employing a large staff of specialists to detail all the special work. The reply of English architects would be that their American brothers were subject to different conditions; that there the smaller men adopted the same methods as here; that the larger men obtained bigger jobs and more work and could offer a reduction of their terms on a quantity, or what comes to the same thing—do more work for the same terms. In fact, we are more advanced in our methods in England, notwithstanding boasts to the contrary. We have adopted the quantity surveyor. In America every builder takes out his own quantities, just as used to be the custom here. The result is that the waste of time on unsuccessful tendering must eventually be paid for by the owner. The adoption of the quantity surveyor means closer tendering, and that, instead of several bills of quantities being prepared for each job, only one is needed, and this serves as an easy method of determining extras, deductions and other matters in dispute. The quantity surveyor is paid for by the client. The adoption of some such method would avoid the present waste of labour in regard to specialist work, instead of following American practice and adding to the staffs of a few architects who would corner all the big jobs. Consulting engineers, who would prepare the details for specialist work, upon which specialist firms would tender and state the variations they might like to make, first suggest themselves. This is plausible in theory, but in practice it does not work out quite so well. The qualifications of the consulting engineer are a doubtful quantity. Even if he does not go far wrong there is no doubt this individual is divorced to a great extent from direct touch with the work and is not quite so up-to-date and efficient as the engineer in the employ of a specialist firm. There are instances of inefficient consulting engineers who needlessly increase the cost of any work they design by disregarding commercial factors. Opinions are by no means settled as to which is the most efficient and economical method of carrying out any of the special branches instanced above. We cannot adopt a fixed standard. In America it is an article of faith that it is a good thing to form a standard, no matter how chaotic and elementary may be our knowledge, this standard being revised every few years. Their steelwork is standardised. The ventilation, heating, lighting and plumbing work is in the hands of comparatively few firms and may be said to conform more or less to a standard not sharply defined. Several possible solutions offer themselves. Firstly, as regards the specialist engineer, why should not the architect ask a firm employing an efficient engineer to hire his services for the preparation of plans under his (the architect's) or another engineer's supervision and put these plans out to open tender? Perhaps this might unduly favour the firm employing the designer, but other firms tendering might be allowed to submit slight alternatives if they so desired. Indeed, the possibility of making variations would often remedy the faults in a consulting engineer's design. The decision as regards variations should always be in the hands of another person, to avoid prejudice—*i.e.*, the architect himself or another engineer should decide. If the plans of a firm's engineer were worked to, an independent consulting engineer, and not the employee of a rival, should supervise the execution, so as to avoid prejudice. Then it is questionable whether a rough and ready standardisation could not be arrived at and be better than none at all. These questions and that of remuneration offer fruitful sources for discussion, and the Royal Institute of British Architects, as our senior representative body, should offer a pronouncement upon this important subject of modern practice. If need be they should also draw up standards.

New, True, or Neither

Writing in reference to surveyors' evidence at arbitrations, and the classification of liars, alluded to in these columns recently, a correspondent points out that there was another version contributed by an eminent English judge, who had for brother an equally eminent engineer, much sought after as an expert witness. The classification was :"Liars, —— liars, expert witnesses, and my brother Fred."

* * *

In connection with the foregoing, it is worth noting that in an important Manchester arbitration recently decided the valuations for the claimant ranged between £31,000 and £33,000, while for the Corporation they were between £17,000 and £19,000!

* * *

We have all met the architect fresh from a church building committee, and hot with wrastling over the vexed question of pews.

How many churches have been ruined by hideous pews, which would have been saved by the unobtrusive and equally efficient rush-bottomed chair.

In the seventeenth century the word "pew" did not necessarily connote an ecclesiastical seat. An inveterate playgoer of those days writing of a visit to the theatre, says, "I could not hear well, nor was there any pretty women that I did see, but my wife who sat in my Lady Fox's *pew* with her." The next time an architect is fighting to exclude from his church varnished abominations in pitch pine, let him suggest that they may be suitable for stalls at the New Frivolity Theatre, but that they won't do for a church.

He also has the support of Sir Christopher Wren, who objected to the introduction of pews into his churches.

* * *

The interest which the great British public take in architecture, and their criticisms and descriptions of it are an abiding joy. I asked a man in what style he would say Messrs. Treadwell and Martin built those gay public-houses such as adorn Tottenham Court Road and Charing Cross. Without any hesitation the reply—

"Perpendicular...........and soda."

* * *

We all know the wonderful and highly Gothic house in Park Lane built for Mr. Hudson of dry soap fame. A friend of mine was asking me a question about it, and, to make it clear what house he meant, said, "You know, Brown Windsor Castle."

* * *

Unstinted as is my admiration of New Scotland Yard, it had never occurred to me that Mr. Norman Shaw exhibited in its design the qualities of a great architectural symbolist. But I was wrong. I have been solemnly assured that the roofs to the corner turrets are dim representations of a policeman's helmet. It will be agreed that the symbolism is—well, dim.

* * *

I suppose most architects have at one time or another suffered from the luminous conceptions of architecture which fill the breast of members of municipal building committees. But other professional men, engineers, for example, are equal sufferers. I recently overheard in the train the following conversation between two members of a Municipal Electric Light Committee. "I think the light we have been supplying is very bad lately." "Just what I said to our engineer, and I told him that to get the light really pure we must use the very best coal." That engineer must be a discreet man, for he apparently made no reply.

The Councillor was probably a relative of that other historic councillor who got up in the council chamber and stated his conviction that the volts at their generating station were "quite the wrong colour."

* * *

It is common knowledge that in a southern suburb of London there was recently exhibited an almost unanimous feeling on the part of the houses on a large building estate that the time had come to quarrel with such foundations as they had, and in some cases, to part company. Hence tears and underpinning.

A candidate at the local borough election was thus heckled :—

"Are you in favour of the foundations being put in before or after the houses are erected?"

Presumably the answer was not satisfactory, for he is not a councillor to-day.

THE LOOKER-ON.

FONTAINEBLEAU.

[*We have arranged for the publication of a series of interesting drawings of the Palace of Fontainebleau in our centre plates. These are not merely interesting as examples of draughtsmanship, but more particularly as examples of French Renaissance, which should be of service to architects. The following are some descriptive notes on the Palace.*]

The Palace of Fontainebleau occupies the site of an ancient château built in 1662 by Louis VII. Francis I., however, is usually regarded as the real founder of the palace, the older portions of which were designed for him by Gilles le Breton and Pierre Chambiges, who were, perhaps, assisted by other more or less well-known architects of their time, whilst Benvenuto Cellini and Andrea del Sarto expended the resources of their art in beautifying the building to enable it to become a suitable royal residence. At a later date the services of Philibert de L'Orme were requisitioned, by Catherine de Medecis, for the enlargement and enrichment of the palace, to which extensive additions were afterwards made by Henry IV. and Louis XIII. The associations attached to this historical building are numerous and interesting, and the names of François I., Henry II., la Duchesse d'Etampes, Diane de Poitiers, and Catherine de Medicis are as indissolubly connected with it as are those of Henri IV., Gabrielle d'Estrées, and Sully. It was at Fontainebleau that the inscrutable Christina of Sweden, while a guest at the French Court, caused her whilom favourite Count Monaldeschi to be put to death, and here, too, Louis XIV., in his young and joyous days, gave some of the brilliant fêtes which, as Voltaire says, ought to be remembered if only on account of their being instrumental in the production of some of the most remarkable of the comedies and plays of Molière.

That fatal and retrograde action—the Revocation of the Edict of Nantes—was signed by Louis XIV. at Fontainebleau when, somewhat late in life, he fell under the evil influence of the bigoted and crafty Madame de Maintenon.

The great Condé died here in 1686, and in the 18th century it had two illustrious guests in Peter the Great of Russia and Christian VII. of Denmark. The palace is also memorable as the scene of the sentence of divorce pronounced against the unfortunate Empress Josephine in 1809, of Napoleon's parting from his old guard (on his first abdication in 1814). and of his review of the same troops during his triumphant march to Paris, after his return from Elba, in 1815.

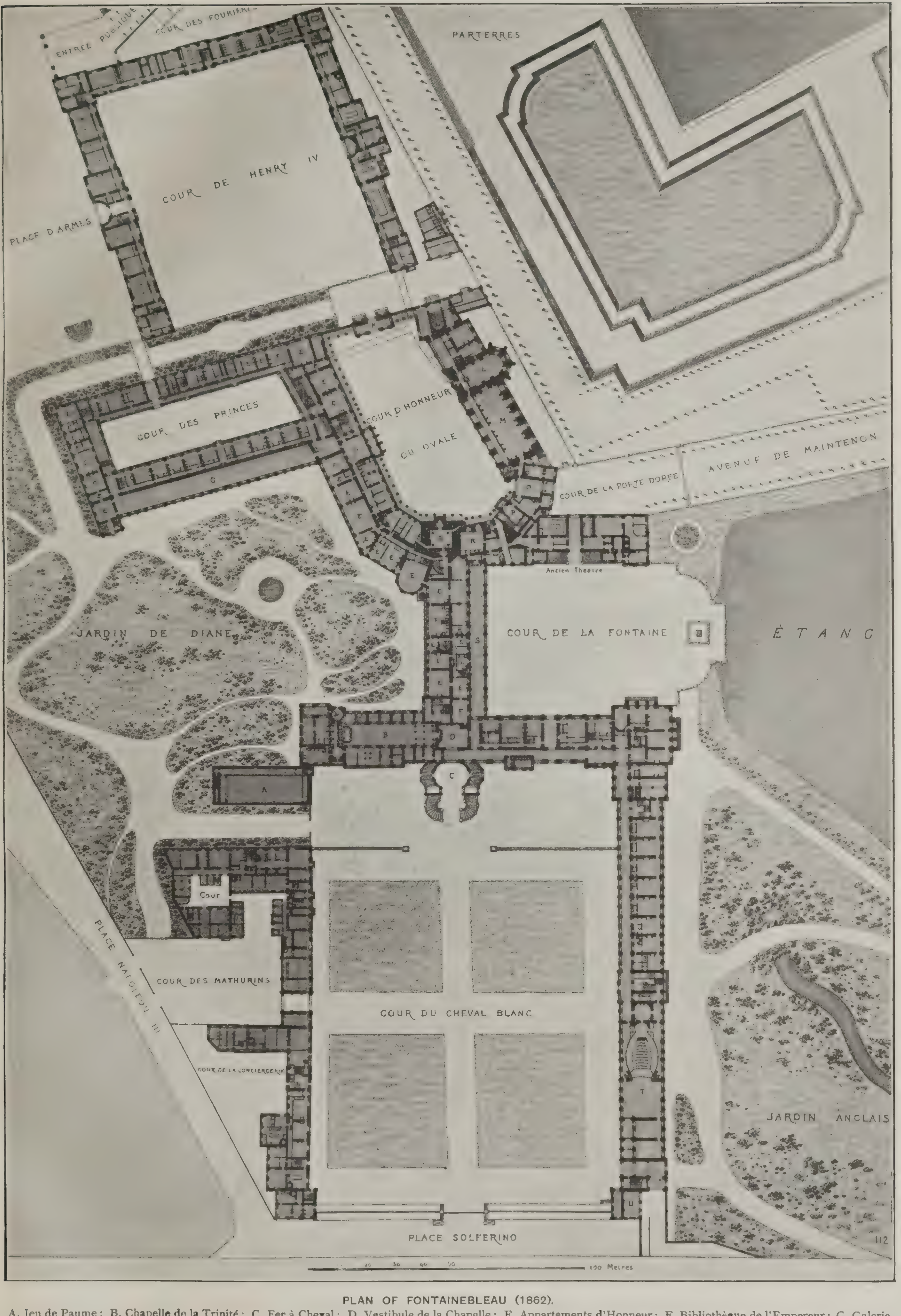
On reference to the plan of the building it will be seen that from the front court (le Cour du Cheval Blanc) the central part of the palace is approached by the huge Escalier-du-Fer à Cheval, so named from its horse-shoe form.

On the ground floor, to the left of this central entrance, is the Chapelle de la Trinité, with its finely-painted ceiling by Freminet (1619), and its 17th-century altar and altar-piece enriched with statuary by Pilon—alike worthy of attention. Opposite the altar is the royal tribune, or gallery, ornamented with the arms of France and the Medicis. A wide staircase connects the chapel with the first floor of the building, in which, on the side of the gardens next the Orangery, are the rooms known as the "Appartements de Napoléon." To the left of this suite of rooms is the "Salle du Conseil," of the period of Louis XV., and beyond is the "Salle du Trône" with its elaborately-decorated ceiling and wainscoting of the time of Louis XIII. and Louis XIV., and the well-known bust of Napoleon by Canova. The adjoining apartments, of Marie Antionette, comprise a boudoir, bedroom, music-room, and a saloon for the ladies-in-waiting. The immense hall, 264ft. in length, known as the Galerie de Diane or de la Bibliothèque, was constructed in the reign of Henry IV. and restored under Napoleon and Louis XVIII. It is decorated with paintings of mythological scenes by Blondel and A. de Pajol. Beneath it is the old Galerie des Cerfs where Count Monaldeschi was assassinated in 1657. The Salons de Réception, overlooking the Oval Court, are embellished with Gobelins and Flemish tapestries. Louis XIII. was born in one of the rooms of this suite of apartments, and another, the Salle St. Louis, contains paintings (relating to the life of Henry IV.) and other works of art. The Grand Staircase (Escalier du Roi) occupies the site of a former room : it contains paintings of various incidents in the life of Alexander the Great by the Italian artists Nic : dell Abbate and Primaticcio. The "Appartements de Madame de Maintenon" have many examples of Beauvais tapestry, and from the "Galerie de Henri II.," or "Salle des Fêtes," which has a fine coffered ceiling by de l'Orme, a beautiful view is obtained of the gardens and the surroundings of the palace. The "Galerie de François Premier" is decorated with a series of allegorical and mythological compositions by Rosso Rossi, relating to the life of Francis I., whose heraldic emblem (a salamander) and the crowned initial letter F frequently occur in various parts of the ornamentation.

The Vestibule d'Honneur, between this gallery and the Escalier-du-Fer à Cheval, has two oak doors of the time of Louis XIII. The "Appartements des Reines Mères" have been occupied by Catherine de Medicis, Anne of Austria, and, in Napoleonic times, by Pius VII., who was imprisoned at Fontainebleau in 1812-14.

The Galerie des Assiettes derives its name from the quaint style in which it is decorated, by order of Louis Phillipe, with plates of porcelain.

Fontainebleau, described by the great Napoleon as the pleasantest palace in Europe, was, from the Middle Ages, one of the chief residences of the kings of France. It has, fortunately, survived the numerous vicissitudes of the French royal dynasties, and almost every monarch, since the time of François I., has left his impress upon the buildings, of which the variety, as well as the varying richness of their architectural details, are interesting exemplars of different phases of the French Renaissance. The extensive buildings (enclosing five great courts known as the Court of the White Horse, the Court of the Fountain, the Oval or Donjon Court, the Court of Princes, and the Court of the Kitchens or of Henry IV.) and the splendid gardens, of which the Jardin Anglais, the Etang des Carpes, and the Port Dorée are among the main



PLAN OF FONTAINEBLEAU (1862).

A. Jeu de Paume; B, Chapelle de la Trinité; C, Fer à Cheval; D, Vestibule de la Chapelle; E, Appartements d'Honneur; F, Bibliothèque de l'Empereur; G, Galerie des Cerfs; H, Vestibule de l'Impératrice; J, Escalier de l'Impératrice; K, Baptistère de Louis XIII.; L, Chapelle St. Saturnin; M, Galerie; N, Escalier de François I.; O, Porte Dorée; P, Escalier de l'Empereur; R, Pavillon de St. Louis; S, Galerie de Henry VI.; T, Salle de Spectacle, Nouvelle, 1859; U, Bains de François I.

attractions, are situated in the midst of the world-famous forest of Fontainebleau, one of the most beautifully-wooded tracts in France, and for many years the favourite haunt of French landscape painters: the forest is said to cover an area of upwards of 81,700 acres, and to be traversed by 12,000 miles of roads and pathways.

Arcading, Cour du Cheval Blanc.

The centre plate in this week's issue shows a large-scale detail drawing of one of the stone niches occurring in the principal facade overlooking the Cour du Cheval Blanc, and adjoining the central entrance or Escalier-du-Fer à Cheval. The work needs no description. We think this plate should be of service as well as of interest to architects.

A. W. S. C.
H. W. W.

THE BEDDING OF STONE.

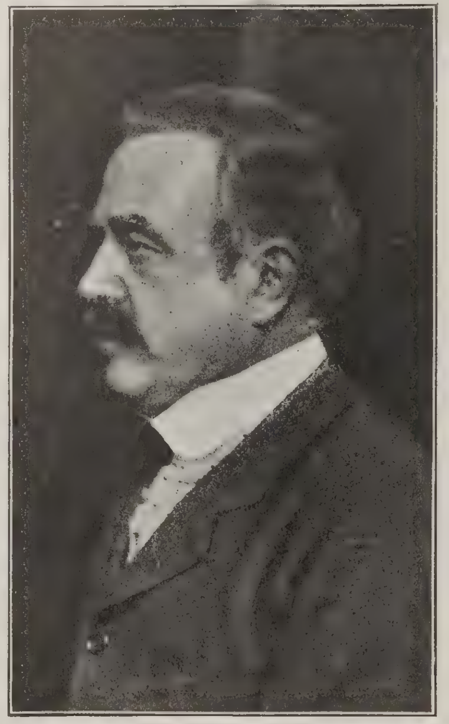
Statement in Regard to Canterbury Cathedral

Replying in the "Times" to statements made in regard to the decaying effect of coal smoke on the stone in the Angel Tower of Canterbury Cathedral, the Mayor, Mr. Francis Bennett-Goldney, says:—"There is no coal smoke in Canterbury for which the Corporation is responsible of sufficient volume or virulence to do any appreciable damage to the stonemasonry of our cathedral. Whatever decay may be perceptible in the fabric is not greater than in many other churches far removed from any suspicious pollutions of the atmosphere, and large portions of the work of Lanfranc and Anselm in the cathedral itself, exposed as they have been to all the evil influences of our coal smoke for a far longer period than the Angel Tower of 1520, bear conclusive witness that the ordinary smoke of our city is not the efficient cause of its decay. . . . To my mind the main cause of decay seems obvious enough. . . . The bulk of the stone at the disposal of the builders was Caen stone which had formerly been used, some of it more than once, in the construction of earlier building works. In a large proportion of the blocks, the real original direction of the grain was lost, and could not be distinguished even by experienced craftsmen. In other cases, probably the large majority, even where the original 'lie' of the stone was more or less clearly distinguishable, the clerk of the works or the stonemason himself was guided in his choice of a block for any particular position much more by its size and shape than by the grain of the stone itself, with the necessary consequence that a great part of the tower is constructed of stones in which the grain runs at an angle totally different from that at which it ran when they were still in the quarry. This circumstance seems to account satisfactorily for the strikingly sporadic character of the decay perceptible. In many instances one stone has almost crumbled away, while the next has preserved its edges and mouldings practically intact. Had the cause of decay been one acting generally, such as coal smoke, the effect produced would have been general, for the material is the same, the only difference being one of position as regards the grain. . . ."

STANFORD WHITE.

The accompanying portrait of the late Mr. Stanford White, of the well-known architectural firm of McKim, Mead and White, is taken from "The Brickbuilder," of Boston, for December, 1906, which issue contains articles on his work, illustrated by numerous photographs and sketches. Prominence to the matter arises, of course, out of the trial of Mr. Harry Thaw for the shooting of Mr. Stanford White in a New York roof-garden theatre last year.

Writing of the work of Stanford White, Mr. C. Howard Walker says: "He associated with a keen appreciation of architectural proportions a sense of appropriate ornament and of decorative light and shade, and his designs so apparently carry conviction of mastery that to all appearances he was allowed free play to his imagination. And imaginative they are, whatever may have been the source of the original suggestion. It has been said of him that his decorative sense was one of his strongest faculties. . . .


STANFORD WHITE.

"He was in a peculiarly fortunate position. In a city where the accumulated wealth of the country was constantly seeking means of expression, with patrons who had little need to count cost, and whom he dominated by his fertile inventions, he had a background of the centuries of the great architecture of the past at hand, and an enthusiasm which carried everything before it. It is apparent that the man and the time had met. And it is all the more amazing that with his versatility of ideas, his love for detail, for intricate schemes of ornament, for multiple combinations of metals, of marble, of textiles, and of painting and sculpture, that each factor so admirably falls into its place in an organic and satisfying whole. . . . He realises his materials and also realises that cast shadows are deceptive and constantly vary in intensity and width, and that forms have mutual relation other than shadow relations. Refinement in mouldings is a characteristic of his buildings, but this refinement is not accompanied by thinness or by any lack of virility. . .

"A veritable Orientalist in his delight in decorated surfaces, he restrains these carpets of detail and creates them as foils to broad simple walls. But beneath all other qualities of his art lies, apparently, a very just recognition of the languages of architecture, those languages which are known to the world at large as styles. In whatever language he speaks, he acknowledges its grammar and its syntax to such an extent that he has been accused of being merely imitative. . . . It is perfectly apparent in Mr. White's work that he thoroughly understood that pronounced styles did not permit radical change in their expression, and he no more thought of perverting their language than he would have thought of halving the height of an Ionic column in relation to its entablature. . . . And a very remarkable series of buildings attest his knowledge of those styles. For instance, there is the Detroit Bi-centennial Memorial in Greek Doric, the Cullom Memorial at West Point in Greek Ionic with the simplicity of a Greek Stoa, the Knickerbocker Trust on Fifth Avenue and 34th Street, an adaptation of the Roman Corinthian of the Temple of Jupiter Stator. The porch of St. Bartholomew's in New York is one of the most interesting pieces of his work, as it so admirably unites the details of the Byzantine of the East and the Romanesque of the North. . . . The details of this porch are very beautiful.

"Mr. White's affection for Italian Renaissance led him to adopt the varieties of that style to many purposes, whether it was simple Tuscan, as in the entrance to the Villard House; Roman, as in the Metropolitan Club; Parman, as in the Parkhurst Church; or Venetian in the Tiffany Building. In each there was a thorough sense of the qualities of the phases of the style and an ability to associate motives and variations with consummate skill. . . . His eclecticism was therefore intelligent and skilled and led him to assemble styles, forms and details with great success. . . . The Madison Square Garden, which was one of his favourite works, is a fine rendering of Spanish Renaissance, much more refined in detail than its prototype. . . .

"Apart from his great skill as an architect, Mr. White had an ability to assemble all sorts of furniture, tapestries, &c., giving each its just relation to its neighbour and its place in the whole scheme of tone and colour, which is granted to but few to possess. The fitting and furnishing of beautiful rooms was one of his favourite occupations."

Of the man himself we get a characteristic indication from one of his pupils, who says:— . . . "a lithe, fierce-moustached giant, with a big hat on a head of close-cropped blond hair standing straight out in every direction. That was Stanford White, and was generally characteristic of the immense nervous vitality that enabled him to accomplish such an incredible amount of work that would have sent most men into nervous prostration. . . ."

Two Nottinghamshire Churches—Kirkby Parish Church and Annerley Church—have been destroyed by fire during the past week. It is believed that an incendiary has been at work.

R.I.B.A.

Two Papers on Marbles.

A meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W., the chair being occupied by the president, Mr. T. E. Collcutt.

The decease of Col. Lennox Prendergast, Hon. Associate, was announced.

The deed of award of the

Prizes and Studentships for 1906-1907

was made known as follows:—

Essay Prize.—The Institute Silver Medal and 25 guineas for the best essay on "The Influence of the Use of Iron and Steel on Modern Architectural Design" was awarded to Mr. Victor D. Horsburgh, A.R.I.B.A., of Edinburgh ("Three Ages"). A certificate of Hon. Mention was awarded to Mr. A. Holcrow Verstage, A.R.I.B.A., of Godalming ("Fonte"). Six essays were submitted.

Measured Drawings Prize.—The Institute Silver Medal and 10 guineas for measured drawings was not awarded. Certificates of Hon. Mention were awarded to Mr. R. Wynn Owen, of Liverpool ("Waynflete"), for drawings of Magdalen College, Oxford, and to Mr. David Robertson, of Glasgow ("Swallow"), for drawings of Stoke Castle, Shropshire. Six sets of drawings were submitted.

Soane Medallion.—The Soane Medallion and £100 (for Continental travel) for the design of a large city hotel facing a public square was awarded to Mr. Harold Cooper, of Chelsea, London ("Cameo"). Certificates of Hon. Mention and £10 10s. were awarded to Mr. Anthony R. Barker, of Harrow ("Simplex"), and Mr. A. J. Pitcher, of Worcester Park ("Urn"). Fifteen designs were submitted.

Owen Jones Studentship.—The Owen Jones Studentship—certificate and £100 (for travel, and study of colour)—was awarded to Mr. Arthur R. H. Jackson, of London. There were only two competitors.

Pugin Studentship.—The Pugin Studentship—silver medal and £40 (for travel in the United Kingdom)—was awarded to Mr. A. J. Margetson, of Birmingham. Three sets of drawings were submitted.

Tite Prize.—The Tite Prize—certificate and £30, augmented this year by £20 under the terms of the Wimperis Bursary (for travel in Italy)—for the design of a loggia for sculpture to screen the blank end (150ft. long) of a building, was awarded to Mr. G. Salway Nicol, A.R.I.B.A., of Birmingham ("Vignola"). A Certificate of Hon. Mention and £10 10s. was awarded to Mr. P. Napier Hemy, of London, N.W. ("Nisi"). Twenty-one designs were submitted.

Arthur Cates Prize.—The Arthur Cates Prize of 40 guineas was awarded to Mr. W. W. J. Calthrop, of Farncombe, Surrey. Three sets of drawings were submitted.

Grissell Gold Medal.—The Grissell Gold Medal and 10 guineas, augmented this year by £10 10s. under the terms of the Wimperis Bursary, for the design of a grand stand constructed of timber on a racecourse, was awarded to Mr. W. A. Mellon, of Westminster ("Royal Ascot"). Four designs were submitted.

Godwin Bursary.—The Council were unable to award this prize.

The Ashpitel Prize of books to the value of £10, awarded to the student who distinguishes himself most highly in any Final Examination held during the year, went to Mr. J. T. Halliday, of Stockport.

(All the designs are now on exhibition in the Gallery of the Alpine Club, entrance in Mill Street, Conduit Street, W., from 10 to 8, until and including Saturday, February 2nd.)

Previous to the award of the prizes and studentships, two papers on "Marbles: their Ancient and Modern Application," were read by Sir Lawrence Alma-Tadema, O.M., R.A., and Mr. William Brindley, F.G.S., F.R.M.S.

Sir Lawrence Alma-Tadema's Paper.

Sir L. Alma-Tadema, discussing the earliest use of marble in buildings, said that, setting aside the sculptured slabs at Nineveh, he had been unable to discover where marble was first used for decoration. Judging from the discoveries at Pompeii its use went back to great antiquity. One of the finest bits of marble in Pompeii was the door-frame of the house of Eumachia, now in the Naples Museum. In Pompeii marble was also largely used for funeral monuments, but always as a veneer over brick or concrete, proving that it was a costly material.

The Romans obtained great dexterity in applying thin slabs of marble, and saved the material itself greatly. This way of utilising marble had a considerable influence upon the form of the mouldings, in most instances the slabs being applied to the bed of cement in such inclination as the body of the moulding required, the moulding becoming subservient to the thickness of the slab. In Rome, during the Republic, marble was most luxuriously used. Wealthy patricians and personal friends of Augustus covered the Campus Martius with colossal constructions of marble.

Having referred to the painting of their marble buildings by the Greeks and Etruscans, the author stated that marble found its highest development, perhaps, in Byzantine architecture, when painting was replaced by mosaic, and when colour reigned supreme; then the outside of the buildings had become severe and simple, and the richness of days gone by found its place in the interior.

When used for interior work nothing was finer, nothing more precious, nothing more wonderful, than a well-adjusted and well-disposed marble decoration.

Mr. William Brindley's Paper.

Mr. Brindley dealt with the modern aspect of marble work in architecture, lamenting the fact that the bulk of the money spent in marble in this country should go to foreign manufacturers and workmen. We had in this country many excellent marbles, and if it were not for foreign competition, with cheap labour and low freights, against our high railway rates, many of the marble rocks now dormant would be worked to the advantage of the land proprietors and the workmen.

Dealing with the sources of supply, the author said that the produce of white marble at Carrara almost supplied the civilised world. The ancient quarries of verde antico in Thessaly were turning out immense quantities of splendid sound material of every kind that was to be found in the old buildings of Rome and Constantinople. Of late years many important monoliths had been quarried and used in England—blocks could be got as large as those used in Sta. Sophia, Constantinople. The old Carystian quarries of cipollino, on the Island of Eubœa, had produced during the last few years over a hundred monoliths of large size. The noblest coloured marble the world had ever known (imperial Egyptian porphyry of Mons Porphyrites) remained unworked. There was any amount of material remaining, and the author offered all the assistance in his power to anyone having an honest desire to re-work these unique quarries.

Coming to present-day uses of marble, Mr. Brindley said that where boldly figured marble was used, the mason's horizontal joint sometimes destroyed the continuance of the coloured pattern. The author suggested the adoption of mitre-jointing in such cases, and in such small works as mouldings round panels in monuments fixed on a slab.

As regards the erection in London of buildings in white marble, if cost were no consideration there would be no difficulty, for the marble would then be used as any good building stone; and if the material were properly selected the work would be as lasting. If economy were desired, the Italian method of built brickwork, with marble slab casing, was a good one. The slab for bond and surface need not be more than 3ins. thick, and even less would make good durable work by using ashlar courses—say, 12ins. or 15ins. high—slightly projected, over 3-in. bond courses. Another method for a good town house would be a brick building with white marble facing in which plaques of porphyry and colour were inserted. For marble work in London simple mouldings would save cost; small detail soon became filled with soot. Cleaning of marble buildings must be done with caution; two or three methods now in use destroyed the silicised surface, which was a preservative.

Discussing pavements, the author said the demand had so increased that it now paid to manufacture them out of block slab. There was much demand for tiles about a foot square, or more, of verde antico, Greek cipollino, and breccias.

Thin tiles of marble could be prepared for walls, to be used for the same purpose as encaustic ones were now used, and fixed by ordinary workmen in the usual way. Stone staircases to dark offices would be improved by white risers of tiles or slips of marble.

The present advance in the use of marble as a decorative material for important buildings might be considered to have commenced about thirty-five years ago with the building of M. Garnier's Paris Opera House.

Discussing English work in Purbeck and other marbles belonging to the country, the author said that our English alabaster was a very useful material for interior decorative work, but it should not be used where it would be exposed to a heat of over 200 degs. Fahr. It was especially adapted for the walls and operating rooms of hospitals, as it was not acted upon by ordinary acids.

The author considered that marble was now being used in architecture in a broader and more dignified manner than was generally done thirty years ago. The nearer we kept to working as the Romans did, with as few colours as possible, the better would be the effect.

A vote of thanks, proposed by Mr. J. J. Burnet, seconded by Mr. Hugh Stannus, and supported by Mr. A. H. Reid and Mr. Collcutt, was passed.

"DECORATIVE CONTRACTS."

Under the above title Messrs. Waring & Gillow have just issued a most interesting collection of photographic illustrations of work executed by them within the past few years. The book is produced in the best possible style and is supplementary to the volume issued by the firm about seven years ago under the title of "Recent Contracts." Messrs. Waring & Gillow are well known as furnishers and decorators of all classes of buildings, and the illustrations in the volume now before us are eloquent of that fact. Within the last few years the scope of the firm's work has increased considerably, more especially by the creation of the Waring White Building Co., which, as all our readers are aware, has already carried out a large number of very important contracts. In our own columns special attention has been directed to this firm by the series of views of the Ritz Hotel in Piccadilly—the first complete example in London of a building erected on modern American methods—and of that fine new building, the Liverpool Cotton Exchange, as well as the new Waldorf Theatre, the Shipping Combine offices in Cockspur Street, and Messrs. Waring and Gillow's own premises in Oxford Street—quite the most imposing block of new business premises in London.

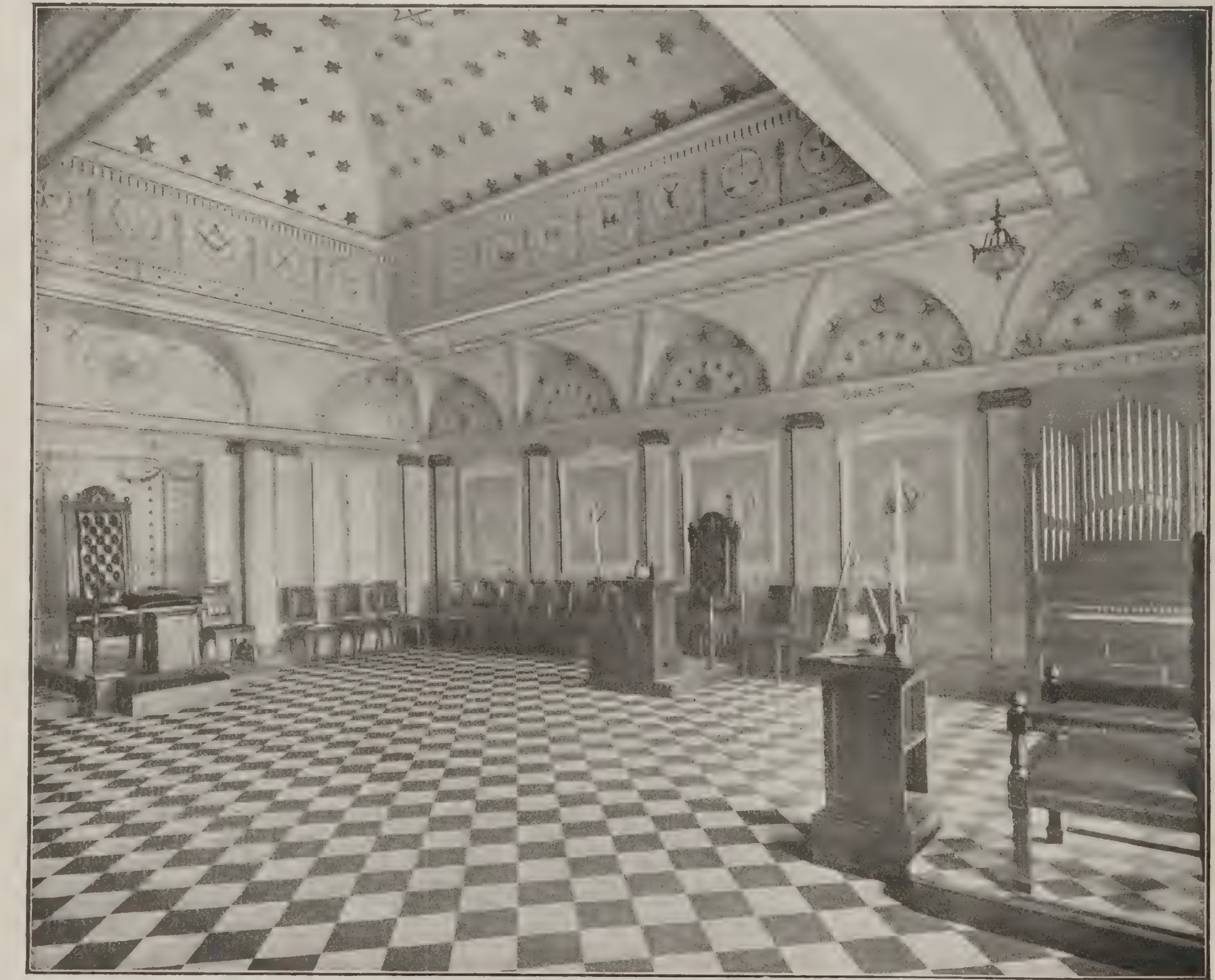
It is noteworthy that there should be such a co-relation of interests as those of Messrs. Waring & Gillow and the Waring White Building Co., because each is a very elaborate organisation, and the facilities afforded by their collaboration are very great. Thus, not merely house furnishing is brought within their scope, but the erection of huge blocks of buildings and the decoration and completion of them down to the smallest details.

In this volume of "Decorative Contracts" are photographs of the new Carlton Hotel in Johannesburg—an example of a steel-frame building carried out on complete American methods—views of the Carlton, Savoy, Ritz and Hyde Park Hotels in London, the Grand Hotel in Dundee, the new Midland Hotel at Manchester, the Hotel D'Angleterre, Copenhagen, the Carlton and the North British Hotels at Edinburgh; numerous restaurants, &c.; saloons and other parts of yachts and liners; the Camden, Vaudeville, Waldorf, Aldwych, Lyceum and New Theatres in London; the Alhambra and the Gâité in Paris; and numerous important office buildings and business premises, besides clubs, royal residences, &c., in various parts of the world. Such a list of works at once proclaims the extensive scope of Messrs. Waring & Gillow and the Waring White Building Co., and it is important to point out that not only are they able to undertake all classes of building, furnishing and decorative work, but also, by reason of the factories under their control and the business arrangements which they possess, they are able to carry out all work with the utmost rapidity—a matter that is becoming more and more important.

The accompanying illustrations of the masonic temple at the Imperial Restaurant, and the boxes at the Camden Theatre, are given as examples of the work shown in the volume here noticed.

The colour scheme of the masonic temple is ivory, cerulean blue and gold, and the various emblems are effectively introduced. The treatment is altogether fresh, and quite a relief in comparison with the very severe formalism which was the dominant character in masonic temples until a very few years ago.

At the Camden Theatre the boxes form, with the entrance to the dress circle, a series of four bays on each side, divided by *brèche violet* Corinthian columns with heavily gilded capitals and bases. Each bay is surmounted with a projecting canopy, daintily modelled. Throughout the house the pervading colour is ivory, enriched with gold.



THE MASONIC TEMPLE AT THE IMPERIAL RESTAURANT, REGENT STREET, LONDON.

CAMDEN THEATRE, LONDON. W. G. R. SPRAGUE, ARCHITECT.

Correspondence.

Adjoining Owners' Right of Light: Underpinning.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—Allow me to correct the statement on p. 18 of your issue for January 9th in reply to an enquiry under the above head. X says: "I cannot see how any action for trespass can possibly lie—*no damage has been sustained.*" This embodies the very general misconception in regard to the law of trespass. The law stands thus:—If a man trespass upon my land, an action for trespass lies against him whether he do any damage or not, and he is liable to pay *nominal damages* and *costs.* I cannot, however, recover more than nominal damages unless damage has been sustained. Thus, an action for trespass undoubtedly lies against your correspondent, and the plaintiff would in all probability be awarded nominal damages and costs. But as no damage has been sustained he would not recover more. The point that the trespass was committed some time last year, and is not being continued, is immaterial.—Yours truly,

C. GUSTAVE AGATE.

MANCHESTER.

To the Editor of THE BUILDERS' JOURNAL.

I have no wish to join issue with the correspondent who so kindly volunteers to remove a mote from my eye. His conclusion, though making *theoretically* a distinction, shows *practically* no difference from mine. I am of opinion that an action for trespass in such circumstances would be dismissed as frivolous, and he is of opinion that nominal damages would be given. Let us both keep our own opinion. Trespass without damage is the "grin without the cat": "curioser and curioser."—Yours truly,

X.

An Old Water Main.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—Referring to Mr. Hems's letter about oak water pipes on page 31 of your issue for January 16th, I would corroborate this, it having been my experience to unearth one at Bury about four years ago. In Lancashire elm is practically an unknown wood.—Yours truly,

LONDON, N. B. SATTIN.

The Royal Agricultural Hall at Islington is to be extended by the erection of a large hall (with glazed roof) on adjoining property.

The Old Architectural Association Day Students' Club will hold their sixth annual dinner on Wednesday evening, January 30th, at the Florence Restaurant, Rupert Street, W., 7.15 for 7.30. Members may obtain tickets, price 4s. 6d., from the hon. secretary (Mr. Geoffrey S. Mileham, 408, Mansion House Chambers, 11, Queen Victoria Street, E.C.).

Notes on Competitions

London County Hall—Conditions of Competition.

In their report to the Council in regard to the new county hall, the Establishment Committee say:—

"We have given further consideration to the question of the time to be allowed for the competition for designs for the new county hall, and have considered a letter from the Royal Institute of British Architects, who suggest that nine months should be allowed, six of which should be devoted to the preliminary part of the competition. The time which it was originally proposed should be allowed was eight months, four months to be devoted to each part, but we think the Council will be well advised to allow the additional month suggested, and we have accordingly requested our chairman to ask leave of the Council to make the necessary alterations in the conditions when the same are under consideration by the Council.

"We propose that, in accordance with the practice which we understand usually obtains, a fee should be charged for copies of the conditions and particulars, &c., issued to intending competitors in connection with the competition for designs for the new county hall, and we think that a fee of £3 3s. in this instance will be suitable. This fee will be returned on receipt of a *bona fide* design, or if on receipt of the conditions any architect decides not to compete and returns the conditions, &c., within two weeks."

New School at Sunderland.

In the competition for the new school proposed to be erected at Sunderland, Mr. R. J. Leeson, of Newcastle, the assessor, has made the following award, which has been adopted by the Education Committee:—1st (No. 14), Mr. Clayton Greene; 2nd (No. 18), Messrs. W. and T. R. Milburn; 3rd (No. 23a), Messrs. Henderson and Hall—all of Sunderland.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
Jan.	31	TWO BRANCH LIBRARIES AT SUNDERLAND.—Limited to local architects. Premiums £20 and £10 for each library. Particulars from John W. Moncur, borough engineer, Town Hall, Sunderland.
Feb.	1	CHILDREN'S HOSPITAL AT SUNDERLAND.—Premiums of £100, £50 and £25. Particulars from T. Robinson, secretary, Infirmary Offices, Bank Buildings, Sunderland. Deposit £1 1s.
Feb.	6	FEVER HOSPITAL AT GALWAY.—Premium £25. Particulars from R. F. Mullery, clerk to the Board of Guardians, Galway.
Feb.	16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
Feb.	20	CHURCH AT LIVERPOOL.—To cost £7,500. Limited to architects in Lancashire. Particulars from Rev. G. Peters, 71, Hope Street, Liverpool.
March	3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25 Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford Yorks. Deposit 10s. 6d.
March	15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham.

SOCIETY OF ARCHITECTS.

The Provincial Architect's Difficulties.

At the meeting of the Society of Architects held on Thursday last Mr. G. E. Bond read a paper on "The Practice of Architecture in Our Smaller Cities and Towns."

At the outset, Mr. Bond said he wished it to be understood that he was referring to cities and towns having a population of about 60,000 or less. Here the architect practised under very different conditions to those obtaining in the Metropolis, and it should be remembered that the practice of architecture in large provincial centres like Manchester, Liverpool, Glasgow, Leeds, and others of similar dimensions was carried on under conditions closely allied to those existing in the Metropolis.

In the small provincial city or town the architect could not specialise. The difficulties to be overcome were greater, the qualifications required to ensure success were more varied (for it did not by any means follow that a successful London architect would have been equally successful in the provinces), and success, when assured, even at its best, was necessarily on a lower plane both architecturally and financially.

The increased activity which had resulted from the adoption of municipal schemes for new streets and buildings had not been of advantage to architects practising in the smaller towns, for, succeeding a short period of prosperity, there had been an influx of young ambitious men with varying degrees of experience, seeking opportunities, and concurrently with the growth of municipal enterprise came a development on doubtful lines of the system of

Architectural Competitions,

so that the local men who had been looking forward to the enjoyment of a big share in the prosperity necessarily following upon the progress of their towns, had their hopes dashed to the ground by the action of unsympathetic, democratic councils and boards of guardians, who insisted upon submitting all new and important work to public competition.

Even at the present time this was still a great annoyance, the local architect, experienced and conscientious, finding the best work in his town thrown open to public competition or handed over to a specialist in London or the nearest provincial centre. As a local man with a local reputation to maintain, he would be bound to keep the cost of a building within the limits of the estimate, and this knowledge was a very heavy handicap in a public competition, whereas his rival from a distance could, and frequently did, exceed the estimate by anything from 25 to 50 per cent.

The evil results of competition of this character were most acutely felt in small towns, for it was only in such towns that competitions for buildings costing very small sums were invited. These sums might be anything from £1,500 to £15,000. They were too small to attract experienced and successful men, the result being that the competitors were generally young men who had nothing else to do, in some cases without sufficient experience to work out an estimate, but capable of presenting a set of drawings worked up to a high state of artistic excellence, thus completely outshining in the eyes of an inexpert council or committee the more solid productions of experienced local competitors who were not prepared to spend their time in elaborating their drawings.

It was to be observed, however, with some measure of satisfaction, that conditions of competitions were not so bad as they were 20 or 25 years ago, when the competition craze had reached its highest, or rather its lowest, development. In those days, in some districts it became the rule to invite competitive designs for every small job of a public or semi-public nature, and Mr. Bond mentioned that his first successful competition, 27 years ago, was for remodelling the end of a church at a cost of £130! Country practitioners might congratulate themselves that all councils and committees did not pursue such a doubtful course, the local man in many cases, after having proved his ability and trustworthiness, being given the necessary opportunity to prove his worth on a work of importance.

Qualifications for Success.

What were the necessary qualifications for successful practice in a small town? Putting aside the question of influence of powerful friends and relations, which was the same everywhere, Mr. Bond expressed the opinion that after the usual artistic and practical knowledge of one's profession, business aptitude became a necessity, combined with a keen practical sense of proportion.

"As a rule, the business man in such a town places use before ornament. He cares far more to have his premises suitable and convenient in every respect for his particular business than he does about the style or quality of his elevation, and as it is usually only by making a special effort that he is able to rebuild at all, he naturally desires to cut down the cost to the lowest possible point.

"These being normal conditions, they require serious consideration, and it is here a young architect usually makes his first mistake. With possibly a London or large town training, and having undertaken the commission, instead of devoting his energies to the task of making himself acquainted with the methods of his client's business, with a view to making the plans perfect in their convenience, his thoughts are chiefly centred upon the elevation; he is far more anxious that the building shall be a monument to himself than that it shall be perfectly adapted to its purpose. Now, this is an injustice to the client, and a great error in tactics on the part of a young architect anxious to succeed. . . .

"It may be said that these idealistic young men are comparatively few in number, but nevertheless they are capable of causing a deal of trouble, and of inducing in the public mind a want of confidence in the business qualifications of architects generally. . . ."

Registration.

In the foregoing remarks Mr. Bond said he had been considering to a great extent the position and opportunities of the successful man—say, perhaps 1 in 20, but what about the other 19? These were the gentlemen who would chiefly benefit by the passing of the Registration Bill, and for whom the Society of Architects had been, and was now, strenuously working. The men at the top, whether in London or in the provinces, who were effectively taking the cream could well afford to sit still while their less successful brethren were struggling to secure a share of the skimmed milk.

One of the Worst Professions.

"What with the large general furnishing firms, builders, shopfitters, bar fitters, horticultural builders, and others, who advertise themselves as willing to send down, take measurements, and prepare plans, specifications and estimates free of cost, on the one hand, and estate agents, auctioneers, business valuers, and commission agents, who add architecture and surveying to their other work, on the other, the profession is becoming one of the worst a young man could possibly enter, and it is small wonder to find some of our less successful brethren adding insurance agencies and rent collecting to their legitimate calling; and as a strong reaction has set in with regard to municipal expenditure, the general outlook is black indeed. . . .

"The compulsory examination, which would necessarily be a corollary of registration, would tend to check this flow of mediocrity and incompetence into the ranks of the profession; for a pupil would then appreciate the absolute necessity for study were he compelled to pass a qualifying examination; as it is, he does not recognise any such necessity, many permitting themselves to carelessly slide just at the time when they ought to be laying the foundation of future success."

ARCHITECTURAL WOODWORK.

At the last meeting of the Sheffield Society of Architects and Surveyors Mr. H. L. Paterson, A.R.I.B.A., gave a lecture on "The Architectural Treatment of Woodwork." Mr. Paterson said the abandonment of wood for domestic buildings in France in the 12th century was due to the destructive fires accompanying the constant warfare, but, as Viollet le Duc had shown, two centuries later builders had recourse to wood in order to build as rapidly and economically as possible the great commercial cities springing up in the north and centre of France. The same style of building was characteristic of our own cities, and it was not until the 17th century that wood as a building material was virtually abandoned in England.

The wooden roof was next referred to by the lecturer, and it was shown that this feature attained in England its noblest development, and was used in buildings of a monumental character long after being abandoned on the Continent.

The design of internal ecclesiastical and domestic woodwork was considered from the 13th century, through the Early Renaissance period, and down to Grinling Gibbons' work in St. Paul's Cathedral, which might be regarded as the culminating work of the later Renaissance. The difference in the nature of the carving was remarked upon, and it was shown that in the later work the ornament was no longer cut out of the mouldings, but out of separate pieces which were applied to the work, allowing greater freedom in design and greater delicacy in execution, but to a certain extent interfering with the architectural lines.

Mr. Paterson concluded his paper with a plea for the correct use of woodwork, and he expressed the opinion that, while it might be losing ground as a constructive material, there was little reason to fear that it would be supplanted for internal decorative work.

Obituary

Mr. E. Rosoe Mullins, the well-known sculptor, died recently, aged 58.

The late Sir Charles Philip Huntington of Darwen, director of Wallpaper Manufacturers, Ltd., left estate which has been valued at £222,781 gross.

Mr. Henry Rowe, architect, of Worcester, died on January 10th, aged 86. He had been county architect for over 50 years, city architect for over 40, and architect to the Worcester Permanent Building Society for over 45 years. Associated in later years with his son, Mr. A. B. Rowe, he planned many of the police stations and other public buildings in the city and county, and assisted in the restoration of Worcester's ancient Guildhall.

Mr. Andrew Muirhead, architect, of Dunfermline, died last week. He was only 35 years of age. Among buildings which he designed is the combination poorhouse at Dunfermline, opened on Saturday last. He was also successful in gaining the first premium in connection with the new Carnegie Baths at Dunfermline. Mr. Muirhead had an extensive practice in the Kinross district, and was frequently employed in connection with the renovation and alteration of the schools.

Law Cases

A Builder's Claim.—In the King's Bench Division on January 11th the case of *Chapman v. Burley* came before Mr. Justice Walton. The facts were as follows:—In March, 1903, the plaintiff, a builder of Leicester, entered into a contract with the defendant, a landowner of Leicester, for the erection of a number of shops for £3,990, the conditions of the contract being that the plaintiff was to be subject to the control of defendant's architect, Mr. John Goodacre, of Leicester, who had power to make alterations in the plans, and also additions. Certain alterations and additions were made, which plaintiff said were complied with, but a balance of £465 13s. 9d. was due upon the contract, which defendant refused to pay, and for the recovery of which plaintiff sued. The defence was that the plaintiff did not do the work for which he claimed payment, and, alternatively, that if the work was done it had been paid for.—Plaintiff's counsel said the case had been tried before his Lordship at Leicester, when the issue had been practically decided in favour of the plaintiff, but in consequence of some points raised by defendant his Lordship reserved judgment till he had heard further arguments. The work which was the subject of the contract was really practically completed at the end of 1903, only a few items standing over till the early part of 1904. The action was commenced in October, 1905, but they did not succeed in getting the defence put in till the following March, and now, in January, 1907, the action was still pending, and the plaintiff was lying out of his money for work done in 1903, and he understood the defendant was going to take the case to the Court of Appeal, and perhaps to the House of Lords. He strongly urged that the plaintiff should now have judgment entered for him.—Defendant's counsel said his client had handed over to his architect a large sum of money, and, naturally, he did not want to pay for the same work twice over. The architect had attempted to commit suicide, and had been removed to a lunatic asylum, and in this case the plaintiff looked to the architect for his money and gave him his receipts. Moreover, the work had not been really done by the plaintiff, but by other persons. Of the £465 alleged to be due only £125 was claimed by plaintiff, the remainder being alleged to be due to other tradesmen in various sums.—His Lordship entered judgment for plaintiff for £465 13s. 9d., the question of costs, &c., being held over.

LEEDS & YORKSHIRE ARCHITECTS.

Annual Dinner.

At the annual dinner of the Leeds and Yorkshire Architectural Society held on January 10th Mr. W. J. Locke, replying to the toast of "The Royal Institute of British Architects," alluded to the question of registration. He said a compromise between two opposing parties had resulted in the adoption of a scheme providing for a revision of the charter of the Institute, and for promoting a Bill in Parliament, with the object of securing recognition in the professional sense of the diploma of the Institute. The report of the committee which had been appointed would be published shortly. The object of the registration movement was to improve the status of the architect by ensuring that he should have a proper artistic training, and also that the public should be acquainted with the dignity of his work. That could not be done by a divided, but a united, profession. They had not to contend against the avarice of public bodies, but against the stupidity of the community. They had to awaken the public to the new artistic movement in architecture, and that must be done by the efforts of a combined profession. In an appeal for support of the Institute, he pointed out that it had done much to raise the status of the profession generally.

Mr. S. D. Kitson submitted "The Allied Societies," and, paraphrasing a well-known political statement, said that what architects thought to-day the public thought to-morrow. The alliance between the Royal Institute and the local societies took place, in the majority of instances, in 1889, and there were, he believed, 18 of these allied societies. Referring to the disastrous effect of smoke upon Westminster Abbey, Canterbury Cathedral, York Minster, and other historic buildings, Mr. Kitson suggested that the allied societies might take this question into consideration. He added that the architectural profession was very much overcrowded and notoriously underpaid. There was, however, more mutual forbearance and help among architects than in any other profession, and this was largely due to the local or allied societies, which afforded the opportunity for members to meet, and to their connection with the Institute, which gave them the opportunity of thinking imperially.

Mr. Butler Wilson proposed "The City of Leeds," observing that twenty years ago Leeds had no vistas, but, thanks to an enlightened Corporation, they now had City Square.

The toast of "The Leeds and Yorkshire Architectural Society" was given by Mr. Henry Barran, and responded to by the president, Mr. H. S. Chorley.

Notes and News

A New Children's Hospital at Liverpool has been built at a cost of £80,000.

A Sewage Scheme for Southend is proposed to be carried out by the Corporation at a cost of £150,000.

The New Central Criminal Court in Old Bailey will be opened by His Majesty the King on February 28th.

This Year's Royal Gold Medallist will be announced at the meeting of the R.I.B.A. to be held on February 4th.

A Paper on "The Sculptor and the Garden" was read before last week's meeting of the Edinburgh Architectural Association by Mr. Walter Gilbert, of the Bromsgrove Guild of Applied Arts, Bromsgrove, Worcestershire.

Birmingham Children's Hospital Rebuilding Scheme.—The accommodation being so inadequate at the Birmingham and Midland Children's Hospital in Broad Street, a committee has been formed to draw up a scheme for building a new hospital either on the present site or elsewhere.

"The Pantiles."—By 15 votes to 10 the Tunbridge Wells Corporation decided last Wednesday to take a vote of the townspeople before the Parliamentary Bill is proceeded with for the purchase by the Corporation of the famous mineral Pantiles springs from the Lord of the Manor.

The New Outpatients' Block at St. Bartholomew's Hospital is nearing completion. The frontage to Giltspur Street is 144ft. Mr. E. B. I'Anson, F.R.I.B.A., is the architect. The waiting hall measures 140ft. by 45ft., and will seat 850 people. Messrs. Dove Brothers are the contractors for the work.

The Evolution of Architecture.—A course of 20 lectures on "The Evolution of Architecture (1900 B.C. to 1900 A.D.)" is being given by Mr. Hugh Stannus, F.R.I.B.A., A.R.C.A., at the Northern Polytechnic Institute, Holloway, N., on Wednesday afternoons, from 4 to 5. Fee: 10 lectures, 10s. 6d.; 20 lectures, 15s.

The Word "Gothic."—"Whether or not Vasari was the actual inventor of the term 'Gothic,' he certainly brought it into use. With Vasari the word 'gothic' means 'barbarian,' and he holds that the style was invented by the Goths, after they had conquered the Romans and destroyed all the good antique structures."—Prof. Baldwin Brown in the "Burlington Magazine."

New Speech-Room for Rugby.—A scheme is on foot for providing a new speech-room at Rugby School. £10,500 has already been subscribed, but "to make the speech-room at once architecturally worthy of the school and adequate for its purpose" a considerably larger sum is required. An appeal is made to Rugbeians for funds, which should be sent to the National Provincial Bank, Rugby.

Asylum Architects' Fees.—In giving evidence last week before the Royal Commission on the Care of the Feeble-minded, Mr. J. S. Davy, C.B., chief general inspector and assistant secretary of the Local Government Board, said that the system of paying architects a 5 per cent. commission on expenditure was radically wrong. It was a strong inducement to them to use the best of everything. In Sussex it had been proposed to build accommodation for cattle and pigs at a price working out at £50 a pig. It was also suggested that there should be a separate mortuary for males and females. He thought it was the architect who suggested separating the sexes after death. People were better off in the asylums, in many instances, than they had been all their lives before, and why they should be given theatres, and entertainments, and tennis courts, and so on, he could not understand.

The Society of Architects' Smoking Concert was held at the Great Eastern Hotel on Friday evening, Mr. Albert E. Pridmore presiding.

The L.C.C. Camberwell School of Arts and Crafts.—The annual exhibition of students' work at this school (in Peckham Road, S.E.) is now open from 2 till 10 p.m. until January 31st.

Mr. W. J. Locke, the secretary of the Royal Institute of British architects, is likely to become as well-known as a playwright as he is a novelist. His play, "The Morals of Marcus," is still still running at the Garrick Theatre, and he is now engaged on a comedy called "The Palace of Puck," for Mr. Frederick Harrison, to be produced at the Haymarket Theatre.

Old Building Construction.—In demolishing the interior of Duckworth Hall Farm, Lower Walton, the contractors have discovered that the building (which is very old) is constructed entirely without mortar, stone, or brick, except the outside walls. Staves of oak laid across massive beams and puddled with clay and chopped straw form the floors and ceilings, and inside the walls are of the same material, held together by long willow staves.—A very interesting old "magpie" cottage was discovered at Macclesfield last week.

A Big Scheme for Blackburn.—On Blakey Moor, Blackburn, recently acquired through the purchase and demolition of old and dilapidated property, it is proposed to carry out a scheme of development comprising sessions house and police courts, a public hall, fire brigade and police headquarters, and 29 firemen's dwellings. The site cost £80,000 and the estimated cost of the new buildings is put at £80,480. The scheme also contemplates the conversion of the existing town hall, in order to bring all the departments of the Corporation under one roof, the estimate for this portion of the scheme being another £18,000.

Two New Garden City Schemes.—The Birmingham City Council have agreed to lease land at Bordesley Green to a Workman's Benefit Society for the erection of workmen's cottages on the lines of a garden city. The Corporation is to undertake the cost of the road making, sewering, and laying out of open spaces, the society allowing tenants to purchase houses on payments little higher than the ordinary rental.—At Chatham the Wigmore Estate is to be developed as a garden suburb to be called Howardville, in honour of Mr. Ebenezer Howard. The number of houses is to be restricted to 10 to the acre.

Manchester Architects.—Messrs. A. W. Hennings, A.R.I.B.A., G. H. Higginbottom, Luke Barlow, A.R.I.B.A., William Owen, A.R.I.B.A., and William Canning, Manchester, and Peter Pierce, Stockport, have been elected Fellows of the Manchester Society of Architects.

Some Figures from the Tariff Commission Report.—From a report of the Tariff Commission on the import and export trade of the United Kingdom of 1905-6, we learn that among the imports there has been an increase of 9·9 per cent. in wood and timber, a decrease of 4·6 per cent. in window and German sheet glass, and an increase of 7 per cent. in electrical goods. The export figures show an increase of 17·9 per cent. in iron and steel, and a decrease of 7 per cent. in electrical goods.

Proposed Rebuilding of Southwark Bridge.—Southwark Bridge being so narrow and steep, a proposal to rebuild it was put before the City Corporation last week, and referred to the Bridge House Estates Committee for consideration and report. The cost of rebuilding is estimated at £500,000. The present bridge was designed by Rennie (who also designed London and Waterloo Bridges), and was erected at the beginning of the nineteenth century at a cost of £800,000. Southwark Bridge consists of three cast-iron arches, the centre span being 240ft., and those on either side 210ft. each. The weight of the ironwork in the bridge is 5,700 tons. From parapet to parapet the bridge is only 42ft. wide, and for vehicular traffic a space of only 28½ft. is available. The width of Blackfriars Bridge at present is 75ft., and when widened it will be 105ft.

Edinburgh Architects and the Restoration of Holyrood Chapel.—At last week's meeting of the Edinburgh Architectural Association the proposal for the restoration of Holyrood Chapel was considered. There was a motion to arrange that a committee should obtain a report on the condition of the Chapel. Mr. Daniel Macfie, who submitted the motion, observed that it was a very general feeling that Professor Lethaby's report considered too much only one point of view, and that there was some call in the public interest for an independent enquiry. Considerable discussion ensued on this motion, some speakers being against any definite action being taken by the Association. Eventually it was agreed that a special meeting should be held to discuss the subject.

SELBY ABBEY RESTORATION.

At a meeting of the Executive Committee held on January 11th the tender of Mr. T. S. Ullathorne, of Selby, amounting to £7,041, was accepted for the restoration of Selby Abbey after the fire (see page 44 of this issue). Mr. Oldrid Scott stated that the roofing of the nave would be proceeded with immediately, and the outer roof of the choir erected from east to west as the damaged piers of the choir were repaired and strengthened to bear the superstructure. The meeting accepted the tender of Mr. Ullathorne at £798 for the rebuilding of the gable, with east and west turrets, of the north transept, which is to have a pitched roof in accordance with the original building. Prior to the fire, the roof of this part of the church was a flat one, but originally it was a pitched roof. On the architect's recommendation it was also decided to underpin the piles on which the Abbey tower stood. It was pointed out that the foundations had sunk very seriously. Mr. Mark Scott (chairman of the Finance Committee) reported that the total amount of the Restoration Fund was £31,810.

It has been announced that an "Association of the Women of England" is to be formed to raise funds towards the cost of restoring the choir of Selby Abbey. It is pointed out that the women of Yorkshire subscribed £30,000 out of the £70,000 required to rebuild Doncaster Parish Church after the fire of 1853.

Views and Reviews.

Sanitary Engineering.

This is one of the volumes in Longmans' "Civil Engineering" series. It was undertaken by Mr. Vernon-Harcourt to supply an omission in the series, and is a very comprehensive work carefully and concisely put together. The second part of the volume, however, dealing with sewage disposal, is hardly sufficiently full to give more than an idea of the subject. In the first part, which is devoted to water supply, the information is much more complete, and the notes on various dams are very full and useful. It would have been better to have made two books, one devoted to water supply and one to sewage disposal. But the reader gains by the conciseness with which the author has been obliged to deal with his information, and he will get a very good groundwork in these two branches of engineering work before proceeding to study them in detail.

"Sanitary Engineering with respect to Water Supply and Sewage Disposal," by Leveson Francis Vernon-Harcourt, M.A., M.Inst.C.E. London: Longmans, Green & Co., 39, Paternoster Row, E.C., price 14s. nett.

SIR ASTON WEBB ON NEW YORK ARCHITECTURE.

"I am not over here to be a critic of New York's architecture, but I am delighted with what I have seen. There seems to be so much life and energy infused into architecture by the profession. Its many-sided activities are evident and its prospects among the sister arts in America are of the brightest. The public buildings in course of erection are most interesting. The great public library of the city—the combination of the Astor and Lenox libraries—is hardly in a sufficiently advanced stage for one to express an opinion, but it will, no doubt, be one of the best examples of the modern French classic style. Then there are the new Custom House on a fine site at Bowling Green, the Metropolitan Museum with its long facade, and bank buildings purposely restrained in a moderate elevation. The immense railway stations, the Grand Central and the Pennsylvania terminus, will be, besides, most important architectural features of the city.

"No; you cannot very well compare New York with London in the matter of architecture. Each city has its own special individual note. In London, perhaps, the red brick predominates in the colour scheme. Here everything is white, sharp, clear-cut in the bright atmosphere. But the effects in the streets are often very fine.

"In the use of materials, again, there is such a wealth of variety and choice. I suppose they have plenty of brick, but the use of stone and marbles seems unlimited. I am looking forward to seeing Washington and the Government buildings."—Sir Aston Webb to the New York correspondent of the *Pall Mall Gazette*.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

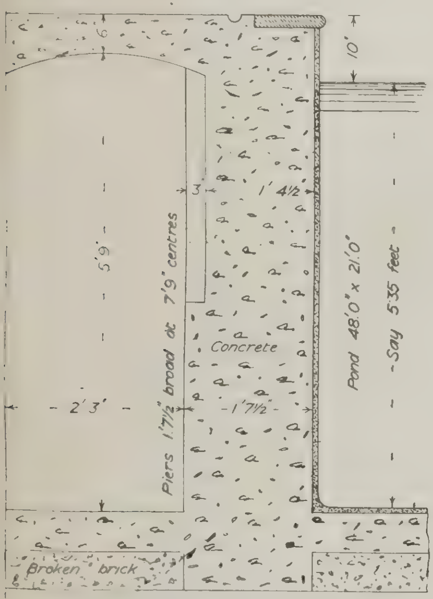
The querist's name and address must always be given, not necessarily for publication.

Concrete Wall for Pond.

EDINBURGH.—C. R. L. writes: "The accompanying sketch shows the side wall of a pond which it is proposed to build of concrete without steel reinforcement. Would the wall be strong enough as shown? Are there any formulæ for calculating the strength of concrete which is not reinforced by steel? What is the method of calculation in the above case?"

The measurements given for the depth on the two sides of the wall do not agree, but in the section herewith the depth of water is made to suit the measurements at the back of the wall. The arch covering the space will act as a supporting strut to the back of the wall, so that the wall will be in the condition of a girder supported at both ends and loaded with a gradually increasing load. The bending moment produced by this load will be equal approximately to twice the water-pressure per sq. ft. at the base of the wall, thus $\frac{5{\cdot}35 \times 62{\cdot}5 \times 2}{112}$ = say, 6cwt.-feet. An approximate formula for strength of plain concrete wall under such conditions (allowing a factor of 4 for the difference between ordinary and specially skilled labour) would be $t = 4\sqrt{2{\cdot}3\text{M}} = 4 \times \sqrt{2{\cdot}3 \times 6} = 4 \times 3{\cdot}8 = 15{\cdot}2$ins., so that the proposed wall may be taken as about right. M in the formulæ is maximum bending moment.

HENRY ADAMS.



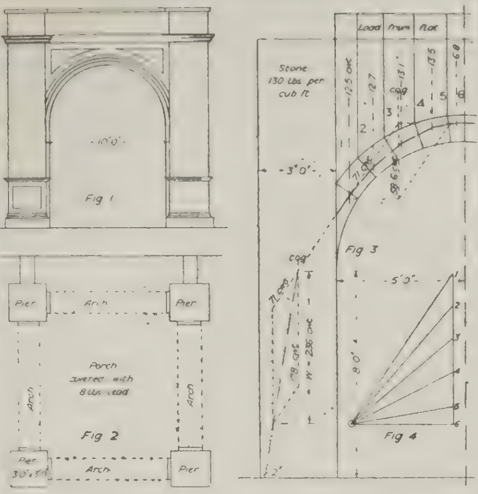
CONCRETE WALL FOR POND.

Stability of Porch.

CARDIFF.—ENQUIRER writes: "The accompanying sketch shows a stone porch with lead flat. Kindly say size required for square piers to ensure safety when porch is built in (*a*) Bath stone, (*b*) hard stocks in cement faced with Bath stone. I have made the piers in sketch 3ft. square."

The elevation of the porch is shown in Fig. 1 and the plan in Fig. 2. To find the thrusts, draw the outline elevation, Fig. 3, and divide the arch, whether brick or stone, into assumed voussoirs. It will be seen that the springing of the arch acts virtually as a corbel forming part of the pier, and should be so constructed. The centre of gravity of arch and load above must next be found. The load above the arch will be divided as shown, and the weight and centre of gravity of each part found. By the parallelogram of forces the thrusts at springing and crown may then be determined. Next set down the load line 1 to 6 in Fig. 4 and make 6—0 equal to the thrust at crown. Join from 0 to the points on the load line, and across their respective spaces in Fig. 3 draw parallel lines, giving the curve of thrust shown by stroke-and-dot line in Fig. 3. Now combine the thrust at skewback with the weight of pier, giving a final resultant cutting the base 2ins. within the outer edge. The maximum pressure will then be $\frac{2}{3} - \frac{\text{W}}{d} = \frac{2 \times 236}{3 \times \frac{2}{12} \times 20} =$ 47 tons on 3ft. wide, or $\frac{47}{3} = 15{\cdot}6$ tons per sq. ft., which is doubled by the thrust from the other arch, making $15{\cdot}6 \times 2 = 31{\cdot}2$ tons per sq. ft. This is much too great for Bath stone, and the porch should be strengthened by four rows of hoop-iron bond over each arch to counteract the outward thrust of the arch and keep the resultant nearer to the centre of piers. The hoop-iron should be protected against rusting by painting with cement wash.

HENRY ADAMS.



STABILITY OF PORCH.

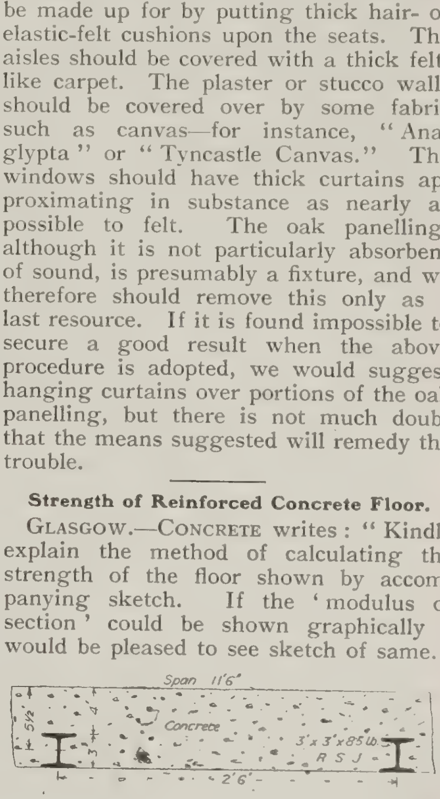
Bad Acoustics in a Church.

GLASGOW.—J. F. writes: "In a church in this district we are much troubled with the acoustics. There is not so much of an echo as a reverberation of sound. It appears to go over the heads of the hearers and then back, the speaker being heard well in front and at the back, but imperfectly in the middle of the church. Kindly suggest a remedy. Rough sketch sent (not reproduced)."

We have made calculations regarding the acoustics of the building, and we find that with a full congregation there would be far too much reverberation, which you suggest is the trouble: in fact, the duration of residual sound would be about 1 : 9 seconds, and if the building were only half filled with people the duration of residual sound would be as high as about 2 : 25 seconds. This means that the church in its present form is excellent for orchestral music or singing, but is very bad for speaking. To be good in the latter respect no residual sound should remain after the cessation of a noise, but, in any case, the duration should not be more than one second, otherwise the reverberation will make it difficult to hear words. The acoustics of the church are, of course, governed by two considerations—the cubic capacity and the amount of absorptive material. It is fairly obvious that the cubic capacity cannot be diminished without injuring the appearance, besides incurring considerable expense: indeed, to reduce the cubic contents by a sufficient amount is impossible in the circumstances. The remedy is therefore to increase the amount of absorptive material in the church. One must allow for the building being only half-filled at times, and in such case the loss of the very considerable absorptive value of persons must be made up for by putting thick hair- or elastic-felt cushions upon the seats. The aisles should be covered with a thick felt-like carpet. The plaster or stucco walls should be covered over by some fabric such as canvas—for instance, "Anaglypta" or "Tyncastle Canvas." The windows should have thick curtains approximating in substance as nearly as possible to felt. The oak panelling, although it is not particularly absorbent of sound, is presumably a fixture, and we therefore should remove this only as a last resource. If it is found impossible to secure a good result when the above procedure is adopted, we would suggest hanging curtains over portions of the oak panelling, but there is not much doubt that the means suggested will remedy the trouble.

Strength of Reinforced Concrete Floor.

GLASGOW.—CONCRETE writes: "Kindly explain the method of calculating the strength of the floor shown by accompanying sketch. If the 'modulus of section' could be shown graphically I would be pleased to see sketch of same."



The strength of a reinforced concrete floor may be found by the formula $\text{W} = (0{\cdot}37p + 0{\cdot}214)\frac{bd^2}{\text{L}}$, where W = safe load in cwts. distributed, including weight of floor itself, b = breadth of a unit width of concrete in ins., d = depth of concrete in ins. to centre of reinforcement, p = percentage of reinforcement, L = clear span in feet. Applied to the given case shown in the accompanying illustration, $\text{W} = (0{\cdot}37 \times 1{\cdot}5 + 0{\cdot}214)\frac{30 \times 5{\cdot}5^2}{11{\cdot}5} = 0{\cdot}77 \times 79 =$ say 60cwts. distributed. The floor weighs $11{\cdot}5 \times 2{\cdot}5 \times \frac{7}{12} \times 1 =$ say 17 cwts., giving an external distributed load of $60 - 17 =$ 43cwts., or $\frac{43}{11{\cdot}5 \times 2{\cdot}5} =$ say 1½cwts. per sq. ft. If the floor is to be fire-resisting, the steelwork should have at least 1½ins. of concrete all round, and in the present case, if the concrete is made deeper, extra weight will be added, and therefore the joists will require to be larger, and, on the other hand, if the joists are placed higher there will not be sufficient concrete above to resist the compression.

HENRY ADAMS.

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Droitwich.—For the erection of a new post-office, for H.M. Office of Works, &c. :—

Stephens, Bastow & Co.	£3,209	0	0
T. J. Mason	3,202	11	9
F. Evered	3,196	0	0
B. W. Whitehouse & Sons	3,049	0	0
S. J. Small	2,968	0	0
Tilt Brothers	2,944	0	0
W. Jones	2,920	0	0
R. Thompson	2,897	10	0
G. H. Marshall	2,875	0	0
J. Elvins	2,870	0	0
J. Dallow & Sons	2,868	0	0
J. Wood & Sons	2,847	0	0
S. E. Spicer	2,817	15	0
T. A. Cole & Son	2,763	14	7
H. Sapcote & Sons	2,747	0	0
J. Bowen & Sons	2,728	0	0
J. Barnsley & Sons	2,688	0	0
H. J. Pitts	2,650	0	0
H. Smith,* Kidderminster	2,588	0	0
C. Griffiths	2,583	12	0

* Accepted.

Enfield.—For taking down existing temporary Church and re-erecting on another portion of the site, also for the erection of new church premises, for the Trustees of Springfield Road Primitive Methodist Chapel. Mr. Frank Bethell, architect and surveyor, 23, Queen Anne's Place, Bush Hill Park, Enfield. Quantities by architect :—

W. Reason, Rosebery Avenue, E.C.	£3,196
F. & T. Thorne, Poplar	2,844
E. K. Wilton, Southgate	2,663
Steed & Sons, Holloway	2,631
A. Porter, Tottenham	2,491
J. Stewart, Tottenham	2,481
Lawrence & Son, Waltham Cross	2,474
Jennings & Grenfell, Waltham Cross	2,400
Thomas & Edge, Woolwich	2,397
Mattock Brothers, Wood Green	2,287
Winter & Sons, Southgate	2,265
Fairhead & Son,* Enfield	2,218

*Provisionally accepted.

Greenock.—Accepted for the installation of a refuse destructor and electric generating works to be erected on the site known as No. 2, Millstead, Dellingburn Square, for the Corporation :—

R. Aitkenhead & Son, brick and mason work	£5,143
Miller & Co., carpenter and roof glazing	1,330
J. McEwan, steelwork	1,562

London, S.E.—For the erection of a new branch library at Hither Green, for the Lewisham B.C. :—

Potter Brothers, Horsham	£4,663	0	0
T. Knight, Sidcup	4,489	0	0
W. T. Blay, Dartford	4,488	0	0
Kirk & Kirk, Westminster	4,450	0	0
S. E. Moss & Co., Southend	4,389	0	0
Webster & Son, Peckham Rye	4,339	0	0
H. Kent, Hither Green	4,336	0	0
R. Lowe, Chiselhurst	4,315	0	0
Perry Brothers, City	4,297	0	0
A. N. Coles, Plymouth	4,276	18	0
F. J. Gorham, Greenwich	4,265	10	0
H. H. Hollingworth, Peckham	4,260	0	0
Thomas & Edge, Woolwich	4,207	0	0
J. Watt, Catford	4,182	0	0
E. J. Claton, Shepherd's Bush	4,155	6	0
Gathercole Brothers, Norbury	4,143	0	0
W. Akers & Co., South Norwood	4,138	0	0
H. L. Holloway, Deptford	4,137	0	0
B. E. Nightingale, Albert Embankment	4,063	0	0
T. McKay, Clacton-on-Sea	4,038	0	0
A. T. Peyton, Lewisham	4,017	10	0
F. & G. Foster, Norwood Junction	3,984	0	0
Hyde & Co., Norwood Junction	3,980	0	0
Patman & Fotheringham,* Islington	3,953	0	0
Losby & Salmon, Hither Green	3,847	0	0

* Recommended for acceptance.

London.—For the reconstruction, on the conduit system of electric traction, of the tramways in Holloway Road, Hackney Road and City Road, and the reconstruction on the overhead trolley system of the tramways from Coborn Road to Bow Bridge, for the London County Council :—

British Electric Equipment Co., Ltd.	£120,000	0	0
Wm. Griffiths & Co., Ltd.	114,506	0	0
J. G. White & Co., Ltd.	108,324	1	0
W. Manders, Leyton	106,093	3	9
Robert W. Blackwell & Co., Ltd.	104,314	0	0
John Mowlem & Co., Ltd.	102,989	0	0
Dick, Kerr & Co., Ltd.*	93,115	12	11

*Recommended for acceptance.
Chief Engineer's estimate, £107,780.

(Recommendation that Messrs. Dick, Kerr & Co., Ltd., be allowed to sub-let to—Anderson Foundry Co., Ltd., Middlesbrough, or Wilson, Pease & Co., Ltd., manufacture of yokes; Doulton & Co., Ltd., or Buller's, Ltd., manufacture of insulators; Bayliss, Jones and Bayliss, manufacture of tie-bars, bolts, &c.; Associated Portland Cement Manufacturers, Ltd., supply of cement.)

London, N.—For the erection of the Holloway (Pemberton Gardens) tramways car-shed, to accommodate 328 cars, for the London County Council :—

Foster & Dicksee, Rugby	£31,714
J. Mowlem & Co., Ltd., London	29,750
McCormick & Sons, London	29,372
E. Lawrence & Son, London	29,362
H. L. Holloway, London	29,331
H. Lovatt, Ltd., Wolverhampton	29,310
Leslie & Co., Ltd., London	28,598
J. Carmichael, London	28,221
Patman & Fotheringham, London	28,203
Kerridge & Shaw, Cambridge	27,460
Kirk & Randall, London	27,296
Holland & Hannen, London	27,046
F. & G. Foster, London	26,522
Holloway Brothers, Ltd., London	26,350
F. & H. F. Higgs, London	25,098
Charles Wall, Ltd.,* London	25,000

*Recommended for acceptance.

Maesteg.—For re-roofing, re-seating, and various other works and alterations to Carmel Chapel, for the Trustees. Mr. E. W. Burnett, M.S.A., architect, St. Michael's Road, Maesteg :—

J. O'Brien	£1,569	12	7
T. Roberts, Pontycymmer, R.S.O.	1,496	0	0
W. J. Jackson, Porthcawl	1,483	0	0
D. Davies & Sons, Cardiff	1,410	0	0
W. T. Lewis	1,400	0	0
J. Lewis	1,244	0	0
E. T. Bevan, Penarth	1,220	0	0
P. Gaylard, Bridgend	1,170	0	0
W. Williams, Cardiff	1,160	0	0
Thomas Brothers*	1,108	0	0

* Accepted.
(Rest of Maesteg.)

Matlock.—Accepted for the erection of a proposed new boarding-house. Mr. D. M. Wildgoose, architect, Edge Road, Matlock :—

J. W. Wildgoose, Industrial Works, Matlock	£2,639

Newtownards.—For the construction of a complete system of waterworks, for the U.D.C. Messrs. Swiney and Croasdaile, MM.I.C.E., engineers, Avenue Chambers, Belfast :—

A. Stark & Sons	£22,814
Collen Brothers	20,000
Fisher & Le Fanu	19,747
Martin & Co.	17,750
H. & J. Martin	16,951
J. Ross & Sons	16,824
Courtney & Co.	16,280
B. Firth & Co.	16,249
Caulfield & Pollok	16,234
G. Lawson	15,980
McKee & McNally	15,590
J. Graham,* Dromore, Co. Down	15,020

Engineers' estimate, £16,260.
* Accepted.

Sutton Veny (Warminster).—For additions to and repairing "Fosters." Messrs. Long and Glass, architects, 53, Market Place, Warminster :—

Wort & Way, Salisbury	£1,525	0	0
Hodder & Son, Frome	1,380	0	0
G. Moore, Trowbridge	1,350	0	0
R. Butcher & Son, Warminster	1,219	15	0
E. Linzey, Trowbridge	1,190	0	0
A. L. Ponton, Warminster	1,170	0	0
W. R. Moody, Trowbridge	1,071	0	0
J. S. Hibberd,* Frome	1,050	0	0

* Accepted.

Selby (Yorks).—For roofing and ceiling nave, north transept, and Latham Chapel, and for outer roofing and oak groining of choir of the ruined Abbey. J. M. Oldrid Scott, architect, Westminster :—

Willcock & Co., Wolverhampton	£10,014	0	0
Quibell, Hull	9,929	11	4
Dove Brothers, London	8,875	0	0
Cornish & Gaymer, North Walsham	8,390	0	0
Thompson & Co., Peterborough	8,334	0	0
Armitage & Hodgson, Leeds	8,004	0	0
Martin, Northampton	7,769	0	0
Bowman & Son, Stamford	7,725	0	0
Collins & Godfrey, Tewkesbury	7,535	0	0
T. S. Ullathorne,* Selby,	7,041	0	0

*Accepted.

Bankruptcies.

[Abbreviations: R.O.—receiving order; P.E.—public examination; C.C.—county court; O.R.—official receiver; Adj.—adjudication.]

During the week ending Jan. 18 eighteen failures in the building and timber trades in England and Wales were gazetted.

F. White, builder, Hythe. R.O., Jan. 5.

E. Evernden, builder, Battersea. R.O., Jan. 4.

A. Bennett, builder and plumber, Hull. R.O., Jan. 3.

W. J. Blackler, builder, Torquay. Liabilities, £160; assets, £25.

D. Edwards, builder and contractor, Ynysddu. Deficiency, £1,895.

Joshua Prout, builder, Barry. Gross liabilities, £7,204; deficiency, £2,728.

J. K. Pope, contractor, Dorchester. P.E., County Hall, Dorchester, Feb. 22, at 10.30.

H. O. Pearson, builder, Wolverhampton. Liabilities, £1,331; assets estimated, £152.

E. Danks, builder, Birmingham. Liabilities, £1,475; assets, £162; deficiency, £1,313.

E. T. Chuttwell, builder, Hampstead. P.E., Bankruptcy Court, Feb. 13, at 12. Adj., Jan. 4.

A. D. Boddy & Son, builders, Norwich. Gross liabilities, £2,602; £1,038 expected to rank; assets, £509; deficiency, £571.

H. W. Thompson, painter and paperhanger, Boroughbridge. P.E., Courts of Justice, York, Feb. 1, at 11. R.O., Dec. 31.

W. C. Peek, builder, Brighton. First meeting, O.R.'s, Brighton, Jan. 17, at 10.45. P.E., Brighton C.C., same day at 11. R.O., Dec. 31.

C. W. Howgate, builder, Harrogate, late of Ilkley. Gross liabilities, £12,345; £824 expected to rank; assets estimated to produce £2,746.

W. Hunter, plumber, West Hartlepool. First meeting, Grand Hotel, West Hartlepool, Jan. 16, at 2.30. P.E., Sunderland C.C., Jan. 31, at 11.15.

New London Buildings

At yesterday's meeting of the London County Council the Music Hall and Theatres Committee and the Building Act Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics:*

Drawing submitted by W. J. Rose, showing the erection of a fireproof chamber to contain a motor generator in the basement and under the stage at the Coronet Theatre, Notting Hill Gate, and the conversion of an adjoining vault into a cell chamber. (*Consent.*)

Drawing submitted by B. Crewe with regard to certain proposed additions and alterations at the Foresters' Music Hall, Cambridge Road, Bethnal Green. (*Consent.*)

Drawing and specification, submitted by Wylson and Long, of the heating arrangements proposed to be provided at the London Pavilion Music Hall, Piccadilly Circus. (*Consent.*)

Drawing submitted by F. Matcham and Co., showing the proposed re-seating of the pit stalls at the Palace Theatre of Varieties, Stoke Newington. (*Consent.*)

Drawing submitted by A. Parnacott, showing certain works proposed to be executed in connection with the heating installation at the Paragon Theatre of Varieties, Mile End. (*Consent.*)

Drawings submitted by B. Crewe, of a Hippodrome proposed to be erected on a site between Nos. 327 and 333, Harrow Road. (*Consent.*)

Drawings submitted by W. G. R. Sprague with regard to the music hall proposed to be erected at the junction of Kilburn High Road and Kilburn Priory. (*Consent.*)

Drawings submitted by A. Ritchie and Co., showing certain works proposed to be executed in connection with the heating installation at the Queen's Music Hall, High Street, Poplar. (*Consent.*)

Drawing submitted by A. B. Jackson, showing four cupboards proposed to be constructed in the wardrobe room of the Savoy Theatre, Strand. (*Consent.*)

Building on a site abutting upon the northern side of New Kent Road and the Western side of Old Kent Road, Bermondsey, on the application of A. Harrison, on behalf of the Southwark Metropolitan Borough Council. (*Consent.*)

Retention of a water closet and urinal addition at Sadler's Wells Theatre, on the north-western side of Rosebery Avenue, Finsbury, on the application of A. W. Osborn, on behalf of H. A. Freeman. (*Consent.*)

Iron and glass porches to four houses on the eastern side of Kinveachy Gardens, Greenwich, on the application of C. E. Charon. (*Consent.*)

Additional storey to No. 24, Cottesmore Gardens, Kensington, to abut upon Stanford Road, on the application of F. E. Williams, on behalf of F. Arnold Baker. (*Consent.*)

Stone front to the one-storey portion of No. 28, Catford Hill, Lewisham, to abut also upon Stanstead Road, on the application of T. B. Whinney, on behalf of the London, City and Midland Bank. (*Consent.*)

Porches and bargeboards to Nos. 1 to 31 (odd numbers only) inclusive, Girton Road, Lewisham, on the application of Eastman Brothers. (*Consent.*)

Building on the south-western side of Thornsbeach Road, Catford, with the flank of such building abutting upon Bargery Road, on the application of Norfolk and Prior, on behalf of J. Watt. (*Consent.*)

Two four-storey bay windows and two projecting hoods in front of Nos. 18 and 20, Rosendale Road, Dulwich, on the application of D. W. Chapman-de-Louth, on behalf of Miss F. C. Southwell. (*Consent.*)

Three iron and glass shelters at a proposed theatre to abut upon Rupert Street and Shaftesbury Avenue, on the application of W. G. R. Sprague, on behalf of the Jacobus-Marler Estates, Ltd. (*Consent.*)

Wooden pent roof in front of premises on the eastern side of High Street, Dulwich Village, on the application of C. B. Core, on behalf of Wraight & Dumbrill. (*Refusal.*)

Showcase in front of No. 374, Mare Street, Hackney, on the application of Barrett & Power, on behalf of W. Prewer. (*Refusal.*)

One-storey shops in front of Nos. 49 and 51, Wedmore Street, Islington, on the application of J. W. Kelson. (*Refusal.*)

Iron and glass covered way in font of a building on the southern side of Wigmore Street, St. Marylebone, eastward of Welbeck Street, on the further application of Wallace & Gibson, on behalf of Debenhams, Ltd. (*Refusal.*)

Proecting balconies at the first, second, third and fourth floor levels of No. 22, Great Alie Street, and No. 49 to 55, Mansell Street, Whitechapel, on the application of F. Selby, on behalf of S. Harris. (*Refusal.*)

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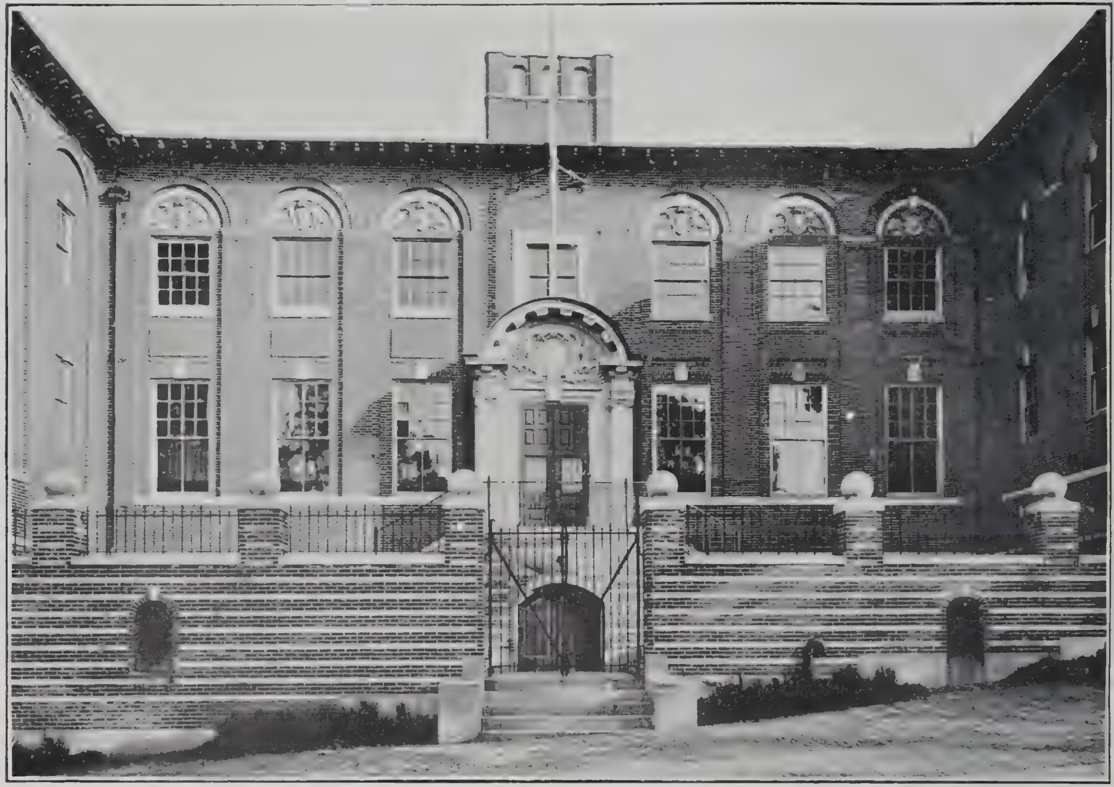
Wednesday, January 30th, 1907.



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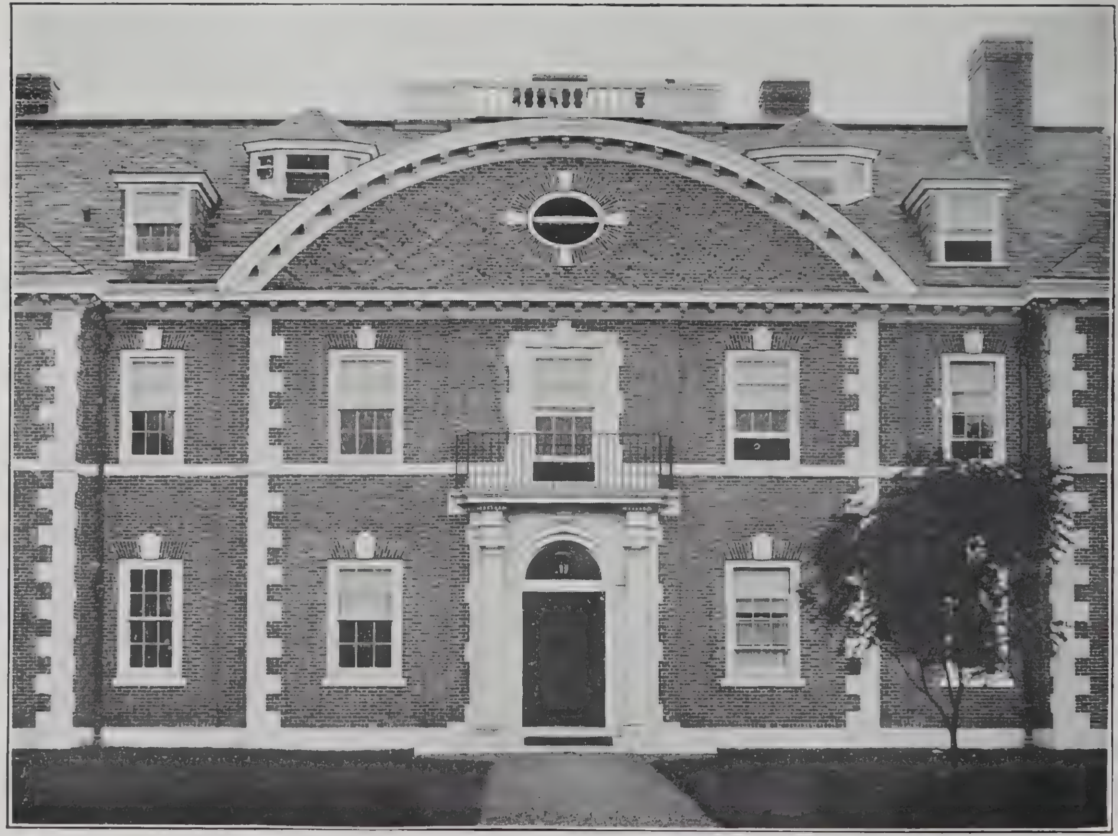

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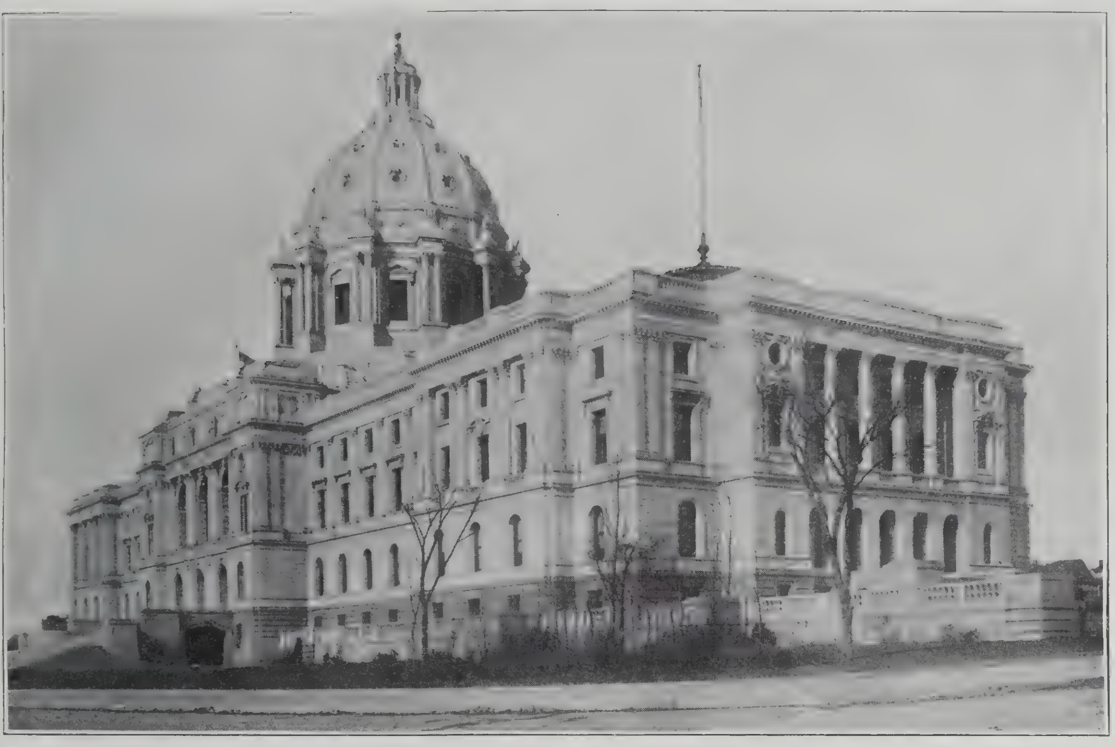
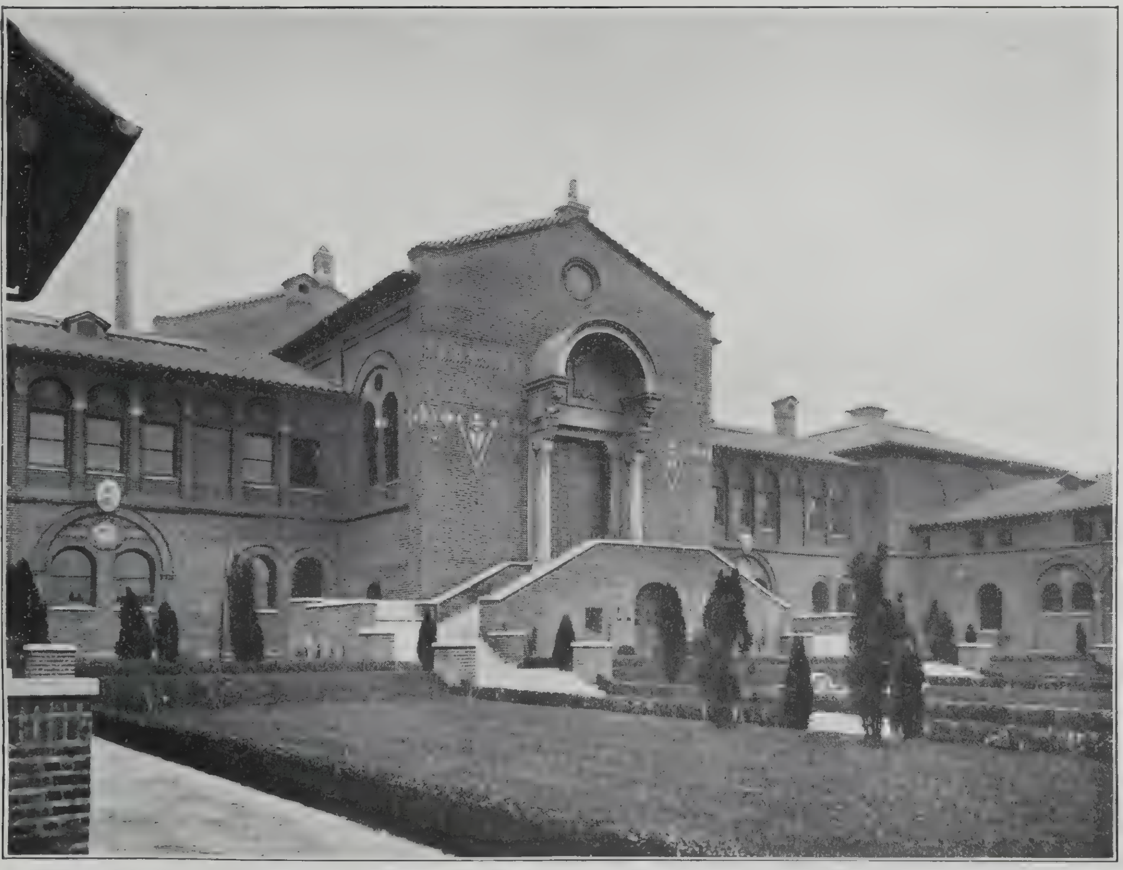


MINNESOTA STATE CAPITOL. CASS GILBERT, ARCHITECT.



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January 30, 1907. Volume 25, No 625

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The Corrupt Practices Act. THE attention of architects is directed to the Prevention of Corruption Act now in force, and it is to be hoped that the provisions of this measure will be strong enough to prevent much of the undesirable bribing that has occurred in the past. It is perfectly true that a man cannot be bribed unless he desires, but there are some so-called architects who regard the extortion of a commission from the firm supplying material as quite an everyday matter, and not at all in the nature of a bribe. Needless to say, such men are not among the reputable members of the profession. Their shady dealings, nevertheless, militate very seriously against the status and good name of their more honourable professional brethren. The architect having control over everything in connection with any particular building has many opportunities of obtaining commissions. On several occasions we have drawn attention to circulars from ingenious persons who have offered, quite openly, to pay commissions to architects for specifying the use of their goods, and if there are firms so anxious to pay these commissions, and so frank about it, it stands to reason that they must have some good ground for supposing that architects would enter into the arrangement suggested. And we know there are architects who are not merely content to take commissions when offered, but who go out of their way to procure commissions from firms whose goods they propose to utilise in their buildings. If the new Act is found satisfactory in working, this form of corruption will, presumably, be speedily stopped. The payment of commissions to architects means, of course, a loss to the principal in the end, either in the form of increased cost or inferior materials. Another point in connection with the Act is whether the trade discounts obtained by builders from builders' merchants will not also be illegal. It is hardly likely, however, that the established trade customs will be affected by any provisions of the Act. After all, discounts are given as a regular thing in most businesses. The supposition has been put forward that the principal or building owner has no knowledge of the discount given. This is a very doubtful supposition, and, in any case, his agent, the architect, is well aware of it. The point which would seem to determine the matter is whether, if the building owner went to the builders' merchant, he could obtain goods with a discount, like the builder. We think he would generally find that he could not do so. The system of trade discounts to people "in the trade" obtains in almost every branch of industry, and we do not think that any court would hold that such discounts were illegal. In certain building material trades the discount is inevitable by reason of the constant rise and fall in the price of raw materials: among such may be mentioned the metal trades, where discounts afford a means of regulating the price of the finished goods according to the fluctuations in the market price of the raw material. Otherwise catalogues would be impossible.

New, True, or Neither

The scaffolding has now been removed from the central pavilion of the new Victoria and Albert Museum, and the mystery of the main tower stands revealed in all its ——. Up to the time of going to press I have not been able to think of the word I want.

* * *

I have learned to look to America for many things, and it now appears that I have to take off my hat to her, and her amazing Mr. Edison, for the solution of our cheap cottage problem. That solution is:—A Squirt!

* * *

I observe that the American mind readily turns to this facetious implement as a solvent of mechanical enigmas. Certain verses from the poem of Oliver Wendell Holmes on "Contentment" are now singing in my head, thus:—

"Of pictures I should like to own
"Titian's and Raphael's three or four,
"One Turner and no more;
"Evening: the foreground golden dirt,
"The sunset painted with a squirt.

* * *

Mr. Edison will give the serious poet of the future license to write:—"The church spire builded with a squirt." His idea is to form houses complete with floors, chimney-pieces, window-frames, eaves-gutters, drains, and even gas and water services in a single monolithic mass of concrete at one fell blast of squirt. A mould is formed on the principle known to ironfounders, but of steel plates screwed together, and concrete grout is then to be squirted into its remotest recesses. Small houses, an American journal informs me, will cost from 500 to 600 dollars each, and ninety houses may be built from the same mould in a year. The ingenuity of this device is truly remarkable, but I am more impressed by the astounding irreverence of the idea.

* * *

It is not often that the lay literary man pays much attention to architecture and her votaries. We may, therefore, be grateful for the eminent place accorded to Sir Christopher Wren in "Biography for Beginners" with illustrations (he calls them diagrams) by the Napoleon of the "Daily News," Mr. G. K. Chesterton. The portrait of Wren is a convincing piece of artistry, but what shall we say of the noble verse which accompanies it?

Sir Christopher Wren
Said, "I am going to dine with some men;
If anybody calls
Say I am designing Saint Paul's."

But G. K. C. is really out of date.

May we continue?

Mr. Macartney (prefix Mervyn)
Said, "If the 'Mail' thinks it is Swervin'
I'll see to the walls,
Say I am propping Saint Paul's."

THE LOOKER-ON.

THE ARCHITECTURAL ASSOCIATION.

Mr. Clipston Sturgis on American Architecture.

A meeting of the Architectural Association was held on Friday evening at 18, Tufton Street, Westminster, the chair being occupied by Mr. Walter Cave, vice-president.

The following were elected members of the Association:—Messrs. J. Quekett, H. Brewis, E. J. Hatherell, H. F. Chandler, C. E. F. Roe, J. G. Allen, J. S. Huxley, A. F. Bryan, F. Winton Newman. It was announced that Mr. E. R. Sladen had been reinstated.

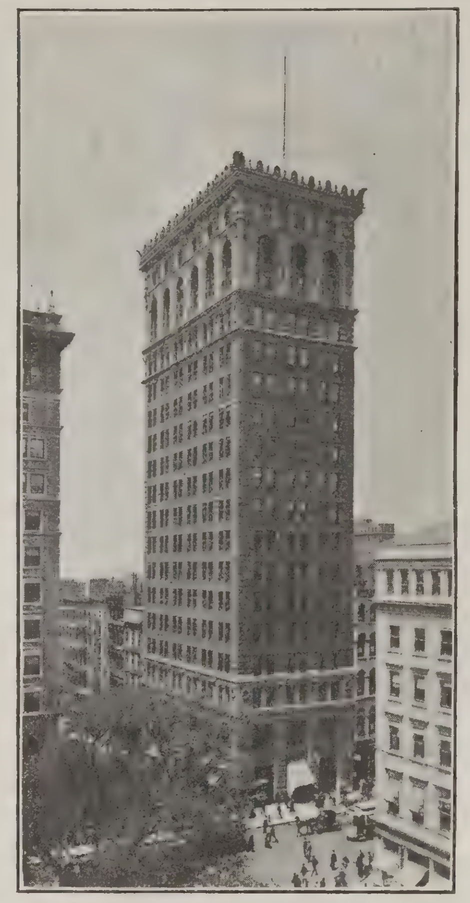
A paper on American Architecture, by Mr. R. Clipston Sturgis, F.A.I.A., of Boston, was then read by Mr. Arthur Keen.

Mr. Sturgis devoted his paper mainly to a critical summary of architecture in America. He pointed out how, at the end of the eighteenth century, revived classic forms came into vogue, the symmetry of classic planning finding encouragement and opportunity in the growth of new cities. Architecture followed closely on the lines of English work, but it was not Houghton nor Blenheim that guided the taste of the Colonists, but that charming house in the Close at Salisbury, and the host of examples corresponding to this work of Wren's. For a while after the establishment of the United States, architecture continued in a quiet and dignified way, but this condition did not continue.

Even in the old world the period from 1830-1870 was a dull time architecturally, but in America it was

the abomination of desolation.

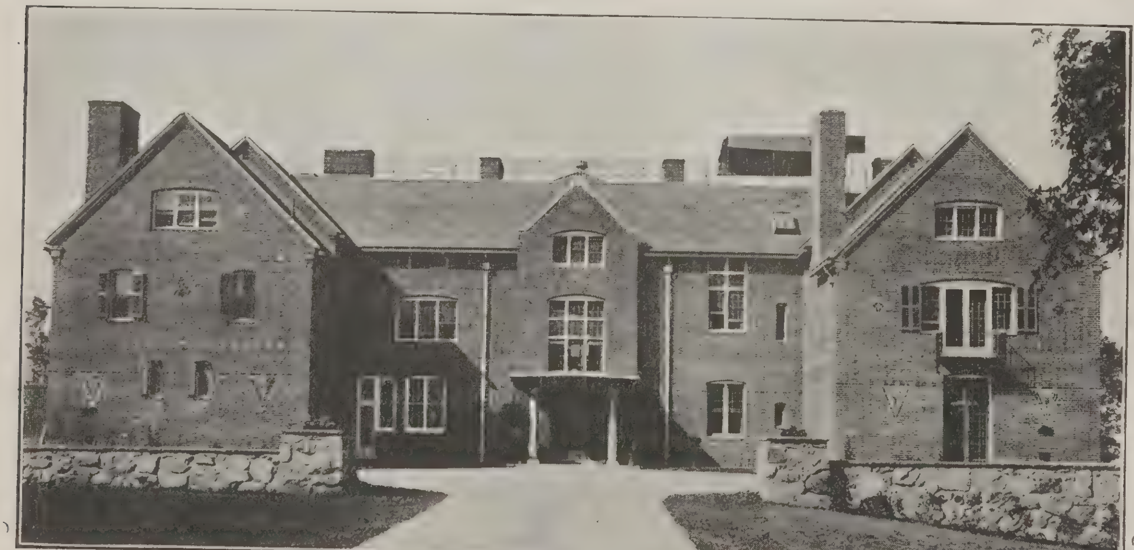
Every kind of good precedent was thrown to the winds. Sound classic precedent slipped into a spurious Greek executed in wood; Gothic, which had long been a *terra incognita* even to the cultivated, was explored by the ignorant and rendered in wood with the aid of the jig-saw. Here and there were sporadic cases of fairly good work, but architecture as a whole was in a most deplorable state at the close of the American civil war. Rapid growth of wealth, and rapid expansion of the people into new territory, made it impossible to build in any but the quickest way, and the constant shifting of population encouraged ephemeral work. This accounted for, if it did not excuse, the unstudied and vicious work done in the forties and fifties.



BROADWAY CHAMBERS, NEW YORK.
CASS GILBERT, ARCHITECT.

After 1865, with the establishment of peace and the rapid growth of prosperity, people had once more a chance to pay some attention to the fine arts. There was an enormous demand for buildings, and those men who in the seventies were thinking of architecture as a profession had the assurance that the well-equipped and well-trained architect had before him a great career.

America's own architectural schools were then in their infancy, and the Ecole des Beaux Arts in Paris offered the best of opportunities for a sound training: so to Paris went the students.



HOUSE AT LINCOLN. WINSLOW AND BIGELOW, ARCHITECTS.

"With eyes newly opened," said Mr. Sturgis, "our people began to see the sound common-sense beauty of the simple classic work of our forefathers. Queen Anne and Georgian work, and the buildings of the early days of independence once more received the attention and reverence they deserved. A small but growing body of men began to stem the tide of horrors which had resulted from an ignorant and unreasoning demand for something new, something American, something which was not part and parcel of the effete civilisation they fancied we had left behind. And added to this new self-respect for our past came a re-awakening sense of the treasures of architectural history in medieval times: so that students returning from abroad had their sketch-books packed with picturesque and often very cleverly drawn sketches of Continental work. It was a surfeit of good things, far more than we were able to digest; the result being at first a host of miserable failures, and a few brilliant successes. The few successes, however, were a great stimulus to the students following, and to those already at work. Each succeeding year saw the students begin work better equipped, and the men in active practice gained knowledge rapidly.

The American Student.

"A nation with so little in the way of architectural inheritance, and with so few conservative tendencies, must necessarily be open-minded to new impressions, and one is inclined to think, consequently, that when the American student crosses the Atlantic he profits more readily from what he sees, and so is better off than the English student to whom so many great architectural examples are within easy reach: nor must he really envy those who live in the midst of the treasures of the Continent. The Frenchman may go to Italy to study, but does not often trouble himself to seek architectural knowledge in England or Holland. The German may travel in France and Italy, but apparently profits little by such experience. The American student goes everywhere with the eager eye of one to whom all is new and wonderful. This is a great advantage. Another equally great is that architects in the United States are largely drawn from the class who have the means for a thorough education as a foundation of their career. Architecture as a profession in America is as highly esteemed as the law, and rather higher than the occupations which until recently were looked upon as the only ones available for an English gentleman's son. The students who go abroad are generally men well equipped intellectually to take full advantage of the opportunities offered them.

"The result of this has been two-fold. The lack of ideas accumulated by study abroad has had the effect of urging our people to new effort, and our confidence in our great and prosperous future has helped us to believe that we would develop altogether a new style of architecture—something American, something quite our own. . . .

HOUSE NEAR PHILADELPHIA. WILSON EYRE, ARCHITECT.

The many-storeyed structure on immensely valuable land may bring its logical solution. The modern methods of construction—the steel skeleton, reinforced concrete—may lead us to new expression; but, if we do so develop, it will be along the lines of the sound planning of the schools, the reasonable laws of construction and decoration that have been exemplified and proved in all the work of the past, and have stood the test of time.

The best architectural work of the past decade in America is not new, is not American, but is conservative—more conservative, one ventures to say, than much of the work of France, with its exposition style of architecture influencing work that is worthy of more serious treatment; more conservative than Germany, with its often grotesque strivings for an art that is new; more conservative than England, whose civic architecture has neither advanced medieval development from the point at which Pugin placed it when the Houses of Parliament were built, nor improved on the classic sobriety and dignity of St. George's Hall in Liverpool.

"American architects have been influenced more or less by all **the architectural experiments of Continent** and have had their own vagaries of experiment.

"Richardson dug into the treasures of Romanesque work, and conceived and executed one or two noble buildings with the spirit of the past and a certain modern vitality; but the experiments conducted by his numerous followers brought disgrace and obloquy on the style. Only in the backwaters of civilisation is it attempted now.

"The decorative motives of India and the Far East were taken by some as the proper form in which to clothe a skeleton structure, the ornament being truly superficial rather than structural—a sound enough theory. But the experiments along this line were more interesting than convincing.

"Modern French has set its rather loud and often vulgar mark on much of our municipal and domestic work in the great cities. The debased examples of this, however, have been such a warning to the leaders in this movement that the work of these leaders is tending to the quietest, simplest and most refined expression of French art; indeed, the best work of this class is almost more closely akin to the precedents of Italy—the Renaissance fountain head—than to those of France.

"English Gothic, especially its collegiate phase, has found its expression here, and with the chastened memory of the early American barbarities in this style, and a grateful affection for such sound old-school examples as Trinity Church, New York, the development has not departed much from sound precedent, but in a general way tends toward what might have been expected if Gothic had continued its natural course. It is, perhaps, needless to add that there has been much ignorant handling of this most difficult style.

The most discouraging tendency in American architecture to-day is its individualistic character—the natural outcome of our form of popular government; consequently, we lack in America good examples of work which depend more on the execution of a well-considered whole than on the excellence of detail. That our architects are able to handle well general problems of planning and composition was abundantly shown in the buildings surrounding the Court of Honour in the Chicago Exposition, and it has been repeated with more or less of success at Buffalo, Omaha, and St. Louis. Such opportunities do not occur under ordinary conditions governing either Federal or large State and municipal undertakings.

"It is perhaps not strange, but it is certainly deplorable, that America, with its many brilliant examples of individual or isolated works of architecture, should be so absolutely lacking in distinguished civic architecture. No autocratic power, either of an individual or of a group of men, has as yet been sufficiently interested in large architectural schemes as to ensure their execution.

"In our individual work, where most progress has been made, our incursions into a variety of styles has resulted in a pretty generally diffused knowledge, a somewhat quick recovery from the strained effort to do something new and different, and a restrained sobriety among our best men which is having its influence in moulding taste throughout the country.

"On the whole, then, the general ten-

HOUSE AT CHICAGO. HOWARD SHAW, ARCHITECT.

dency of the best work in America is toward conservative lines, but in following this course one sees that intelligent use of precedent which shows that the stage of student and copyist is past, and that we are entering—slowly, but soberly and carefully—on the more responsible period of imaginative handling of well-understood laws."

A vote of thanks to Mr. Sturgis for his paper, and to Mr. Arthur Keen for the reading of it, was proposed by Mr. Louis Ambler, seconded by Mr. Matt Garbutt, and supported by Mr. W. J. H. Leverton and Mr. Walter Cave.

Comments on the Buildings Illustrated.

Mr. Sturgis's paper was illustrated by a large number of lantern views, a representative selection from which we are able to give herewith.

The following are the author's comments on the work shown in this issue:—

Minnesota State Capitol.—Completed a few years ago. Mr. Cass Gilbert, architect. A fine and dignified piece of classic work, executed by a man who understands his material thoroughly and handles his knowledge with the skill of an expert.

Museum of Science and Art, Philadelphia University.—Messrs. Cope and Stewardson, Frank Miles Day and Brother, and Wilson Eyre, junr., associated architects. The character of the exterior is an expression of the personal touch of Mr. Eyre, who is essentially a painter, sculptor and designer of ornament. The work as a whole shows the influence of all three firms, and, although it strikes perhaps too strongly the note of medieval Italy, is still a charming piece of architecture.

Cottage Club, Princeton. — Messrs. McKim, Mead and White, architects. While the firm never fail in their large and public buildings to get dignity and monumental qualities, they seldom fail in work of this kind—semi-domestic—in getting a delightful homelike touch.

Railway Station, Albany. — Messrs. Shepley, Rutan and Coolidge, architects. A modern American type, coming on the level with the railway tracks, which are reached by subways and staircases.

Broadway Chambers, New York.—Mr. Cass Gilbert, architect. Representative of that class of building which has its ornament massed at the top. Chosen by the American Society of Civil Engineers as a typical example of modern steel construction, though its exterior is not really expressive of steel construction, except for the lightness of the piers of the lower storey.

House near Boston.—Mr. W. G. Rantoul, architect. This house has frankly received its inspiration from England, yet is quite distinctly American in its expression.

House at Chicago.—Mr. Howard Shaw, architect. A house full of originality and character; yet not at all forced, no effect seeming to be striven for, but all being perfectly natural.

House near Philadelphia.—Mr. Wilson Eyre, architect. The garden side of this house is in every way characteristic of Mr. Eyre's work—a long low house and a straight roof-line, a charming irregularity which yet bespeaks a studied plan, and a beautifully-laid-out garden.

House at Newport.—Messrs. McKim, Mead and White, architects. The work of a master who has spared no time or thought to make his work perfect.

Notes and News

Glastonbury Abbey is to be offered for sale on June 6th.

Mr. Frank Miles Day is the new president of the American Institute of Architects.

The Annual Dinner of the Surveyors' Institution will be held at the Hotel Metropole on Tuesday, April 16th, not on February 6th, as first arranged.

Wolverhampton and District Architectural Association. — Mr. William Edwards has been elected president of this association, and Mr. William J. Oliver vice-president.

A Roof Garden has been provided on the large new block of flats, "Hornton Court," just off Kensington High Street. Messrs. F. S. Chesterton and J. D. Coleridge are the architects.

Architectural Association of Ireland.—At the meeting of this association held last week Mr. L. E. Steele, M.A., M.R.I.A.I., read a paper on "Egyptian Art," illustrated by lantern views, many of which were made from the lecturer's own negatives.

The New Pumping Station for Croydon, in Stroud Green Road, Shirley, was visited recently by a party of 70 students attending the building construction and quantity surveying classes at the Croydon Polytechnic. Mr. George Everitt is the contractor for the work.

New Premises for the Co-operative Society at Paignton have been erected in Winner Street at a total cost of about £4,000. Shops and showrooms, offices, &c., occupy the ground and first floors, and on the second floor is a meeting hall, 62ft. by 35ft. 6ins., with a steel span roof. Messrs. Bridgman and Bridgman, of Torquay and Paignton, were the architects, and Mr. W. Smaridge, of Paignton, was the contractor.

The "Chartered Surveyors' Golfing Society" has just been formed. Membership is restricted to members of the Surveyors' Institution, with a view to arranging matches with societies of the kindred professions, in addition to which it is proposed to hold an annual tournament. Mr. S. James Chesterton, F.S.I., of 116, Kensington High Street, W., is the hon. secretary.

Opposition to the Architects' Registration Bill.—At the last meeting of the Aberystwyth Town Council it was decided to oppose in Parliament the Public Health Acts (Building By-laws) Bill, and the Architects' Registration Bill, as these contained "provisions which appeared to be disadvantageous to local authorities."—At the last meeting of the Estates Committee of the Llanelly Urban District Council it was also decided to oppose the Architects' Registration Bill when it came up for second reading.

Messrs. Patman & Fotheringham, Ltd., of 100 and 102, Theobald's Road, W.C., have secured the following contracts:—Messrs. Thomas Cook & Son's new premises in Fleet Street (Messrs. Smee & Houchin, architects); new buildings, &c., May's Yard, Eagle Street, Holborn, W.C.; for Messrs. H. & G. May (Mr. Hewish, architect); new premises for the Express Dairy Co., Ltd., Tavistock Place, W.C. (Mr. Fitzroy Doll, architect); new library at Hither Green, for the Lewisham Borough Council; alterations, &c., to Messrs. Schweppe's offices, Hammersmith, W. (Mr. Burton, architect); two conveniences in Aldgate and Shoreditch, for the City Corporation.

Notes on Competitions

Conditions for the County Hall.

The recommendations of the Establishment Committee in regard to the competition for the new London County Hall came up for discussion at last week's meeting of the Council, when the conditions of the competition (as set forth on p. 309 of our issue for December 19th) were approved and £2,100 voted as fees for Mr. Norman Shaw, R.A., and the assessor to be nominated to act conjointly with Mr. Shaw and Mr. Riley in the final competition (1,000 guineas each). As already announced in our columns, the eight selected architects to compete in the final competition with the architects selected in the preliminary competition are:—

Mr. John Belcher,
Mr. William Flockhart,
Mr. Ernest George,
Mr. Henry T. Hare,
Mr. T. G. Jackson,
Mr. E. L. Lutyens,
Mr. E. W. Mountford,
Messrs. Nicholson and Corlette.

Each of the competitors in the final competition will receive a fee of 200 guineas. In addition to the architects named above, there will be not fewer than 10 nor more than 15 selected in the preliminary competition.

For the conditions of the competition a deposit fee of three guineas is to be charged, this fee being returnable on receipt of a *bona fide* design, or, in the event of the architect deciding not to compete, if the conditions are returned within two weeks.

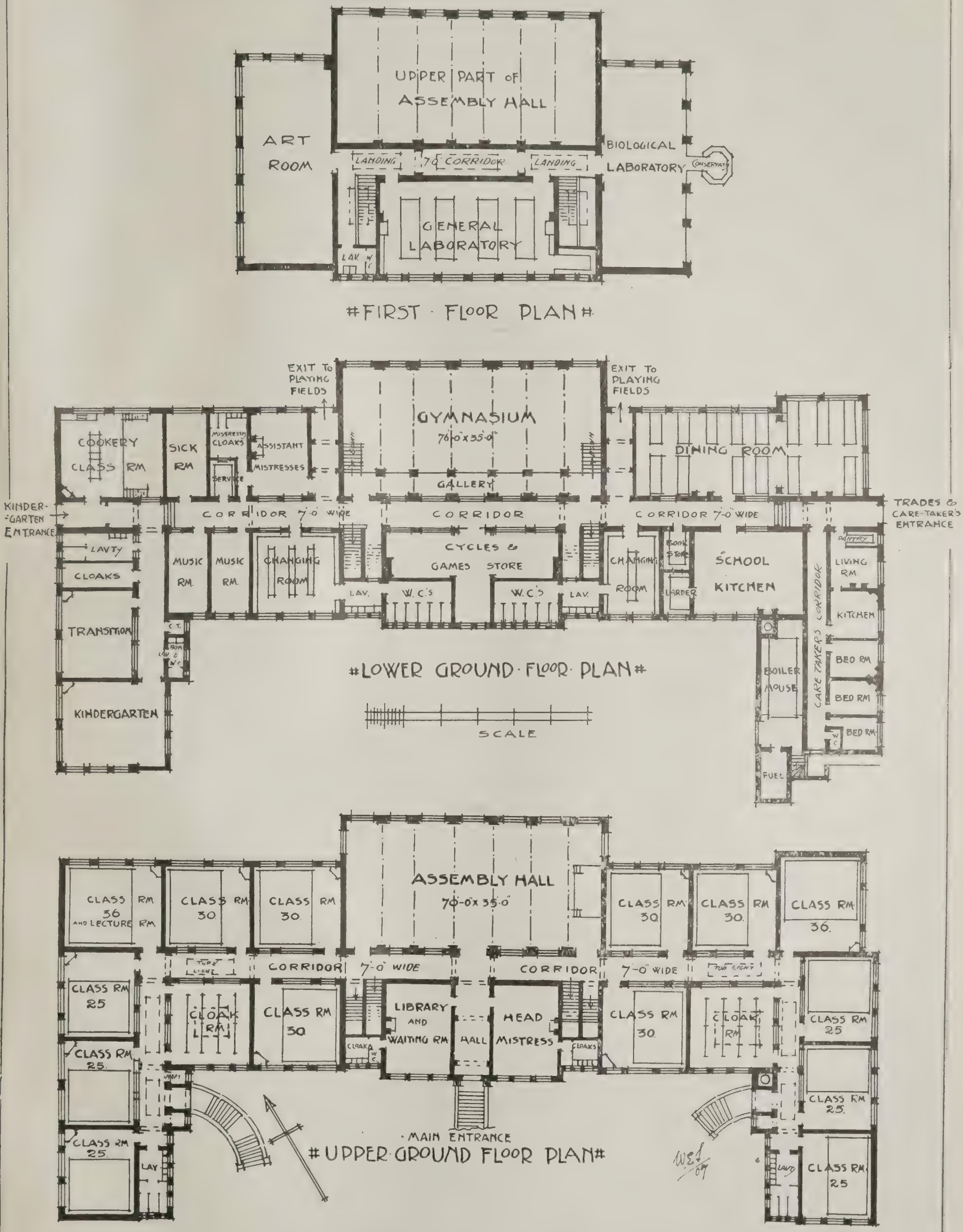
Irish Labourers' Cottages.

The following is the award in the competition for labourers' cottages instituted by the Local Government Board of Ireland:—1st (£50), Mr. Sydney Moss, Eccles; 2nd (£30). Mr. J. Roseman Burns, Dublin; 3rd (£20), Mr. T. Manly Deane, Dublin.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
Jan. 31	TWO BRANCH LIBRARIES AT SUNDERLAND.—Limited to local architects. Premiums £20 and £10 for each library. Particulars from John W. Moncur, borough engineer, Town Hall, Sunderland.
Feb. 1	CHILDREN'S HOSPITAL AT SUNDERLAND.—Premiums of £100, £50 and £25. Particulars from T. Robinson, secretary, Infirmary Offices, Bank Buildings, Sunderland. Deposit £1 1s.
Feb. 6	FEVER HOSPITAL AT GALWAY.—Premium £25. Particulars from R. F. Mullery, clerk to the Board of Guardians, Galway.
Feb. 16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
Feb. 20	CHURCH AT LIVERPOOL.—To cost £7,500. Limited to architects in Lancashire. Particulars from Rev. G. Peters, 71, Hope Street, Liverpool.
Feb. 26	CHURCH HALL, STOCKTON-ON-TEES.—To cost £1,500. Particulars from A. Livingstone, 24, Russell Street, Stockton-on-Tees.
March 3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25 Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford Yorks. Deposit 10s. 6d.
March 15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham.



HIGH SCHOOL FOR GIRLS, BARNSLEY: FIRST-PREMIATED DESIGN.

BUCKLAND AND FARMER, ARCHITECTS.

BARNSLEY HIGH SCHOOL FOR GIRLS COMPETITION.

The designs submitted in this competition by the 49 selected architects were on view for a few days last week at the Doncaster Road Council Schools, Barnsley, and it was evident that much interest had been taken in the competition, as many well-known architects travelled specially from various parts of the country to see the designs, in view of the number of schools of a similar type which are under contemplation, and also because of the award, which has created much comment in the district amongst the competitors themselves.

Conditions.

The particulars supplied to the architects stated that the school had to show accommodation for 450 girls and that the cost should not in any case exceed £35 per head. The Governors of the High School stated that the building should be on the corridor type with separate assembly hall, but they were prepared to consider central-hall plans from any competitor who was of the opinion that it was impossible to build a school of the required accommodation on the separate hall system within the limit of expenditure. Later, particulars allowed plans to be submitted on other than the corridor system, with separate hall. The principal rooms to be provided were :—16 classrooms, kindergarten and transition and sick rooms, teachers' rooms, library, gymnasium, with dressing-room, one general and one biological laboratory, with greenhouse, art room, dining-, cookery- and lecture-rooms, as well as living accommodation for caretaker and the usual cloakrooms, offices, &c.

Site.

The site is practically a parallelogram with a corner facing the main road, and almost south in aspect. From east to west the ground slopes sufficient to allow a basement on the west. Competitors were at liberty to place their building on the land to their own advantage, as the replies to enquiries clearly stated that no particular frontage was decided upon. The disposal of the building on the site appears to have misled many architects, although a visit to the ground would have cleared away the difficulty.

Judging by the premiated and commended designs, the assessor has evidently preferred all buildings facing the main road and set crosswise on the site. This is a natural solution of the problem, though only a few of the plans with this position are successful. The influence of the Liverpool Aigburth Vale competition (previously illustrated in this journal) is evident in the majority of the plans. This is to be regretted, as there was no useful point gained by setting out long corridors at all angles from the main building. The special request of the Governors of the High School with reference to the position of the hall, whether separate or joining the centre of the main building, caused many architects to submit alternative designs. Doubtless the intention was to prevent the competitors being restricted in their planning. It would be best for the promoters to state at the outset the particular type of hall they desire, as the result of this competition is unfortunate owing to a division of opinion on this question, and also on the award of the assessor. A few of the leading architects and also the local competitors are protesting strongly against the design placed first by Mr. E. R. Robson, who adjudicated on behalf of the Governors. He has evidently selected the scheme which cubed the least, and which also had a fair working plan. It would remove the discontent and the opposition which is rising against this particular award if the assessor would clearly explain in detail his reasons for placing the premiated designs. The Governors have implicit faith in their assessor and will doubtless (according to the conditions of the competition) accept his decision. It is to be hoped that the successful plans will not be taken as the type for future secondary schools, as they may suit the requirements of the Barnsley district, but are by no means in advance of some recent satisfactory designs accepted for schools in different parts of the country.

The design placed first

has been submitted by Messrs. Buckland and Farmer, of Birmingham. Their scheme is put at an angle on the site, facing the main road. The situation is correct and the disposal of the building on the ground is good, though the main front is broken up with entrances which might have been placed with advantage at the sides of the end wings. In comparison with the other schemes the authors score on the point of cubical contents, but it is doubtful if the plans as shown at present would pass the Board of Education. The assessor considered it important to have as many classrooms as possible on one floor, and this set has 14 classrooms on the level of the hall. While the plan at a first glance looks simple, yet on examination many serious defects are noticeable. The most glaring are the internal sanitary arrangements—all the latrines are on the lower ground floor in the centre of the building facing the road and adjoining the main entrance and carriage-way. Cycles have to be wheeled through three pairs of doors along a corridor into the centre of the building, where the light is borrowed on one side from a distance of more than 40ft. All the staircases and corridors are badly lighted and should also be wider, the corridors being more than 200ft. in length and only 7ft. wide. Internal steps on the corridor in the basement should be omitted, or placed elsewhere. Cross-ventilation is lacking on the various floors in the classrooms and corridors. The sick-room faces north and is in the basement between a cookery and service room! There is no disconnection for the rooms where the smell of cooking is likely to enter the corridor or classrooms. A gallery is provided in the gymnasium, which is unnecessary. Nine classrooms receive practically north light, and the valuable south light is utilised for entrances and cloakrooms on the ground floor. The position of the art-room windows is practically west, and the laboratories on the first floor are too small and afford space for conveniences wrongly placed on staircase landing.

The plans show a flat on the east wing of the first floor and the elevations show a hipped roof and chimneys also, which do not appear on the plans. The conservatory is conveniently omitted on the elevations. The position of the large chimney shaft on the main front is not a commendable feature, especially when surrounded by a cast-iron cresting as a finial. The building contains 512,656 cub. ft. and is estimated to cost £13,668 3s. 8d., excluding lay-out of grounds.

The design placed second

is by Mr. A. McKewan, of Birmingham. In general disposition this plan is not unlike the successful one, and in many respects is superior, particularly the corridor and sanitary arrangements, though surpassed by many designs exhibited. The assembly hall is badly shaped and the author appears to have been at a loss to work in the badly-shaped rooms caused by the side wings. The caretaker's house is placed in the basement and appears to be lighted by an area, and the main corridor on this floor has only borrowed light. The elevations are quietly treated, and the whole set has no striking original feature worthy of placing the design in this position. The cubic contents is 557,000ft. and would, according to the architect's estimate, cost £14,725.

The design placed third

is the work of the well-known school architects, Messrs. Russell and Cooper, of London. The arrangement of the plan is not unlike the design placed first, with all the objectionable features omitted. The plan of the ground floor meets every requirement contained in the conditions of the competition, and the lighting of the classrooms is ideal. The various entrances are conveniently arranged along the main front. The sanitary wings are disconnected, though still forming part of the main building. The majority of the classrooms are situated on the upper ground floor, also dining-hall and gymnasium, with laboratories on the first floor. The elevations are the best designed, and the whole set is far above the average. It seems strange why this scheme should be relegated to the third place. The assessor admits in his report that it is a "first-class design," particularly the exterior, "with a plan of some merit."

Other Designs.

Among the remaining designs are two schemes by Mr. Willoughby, of Manchester, which are in many respects better than the first two premiated. The plans in particular are balanced and all corridors well lighted, with disconnected sanitary arrangements. Messrs. Russell and Cooper also submitted two sets, their alternative design being more compact than the premiated one. Two of the local architects were in the final running, notably Mr. Dyson, who submitted a very carefully thought-out scheme. The other local architect, who also submitted a creditable design, was Mr. Wilby, his two sets being remarkable for the draughtsmanship displayed. Among the other leading architects were Messrs. Kitson, of Leeds; Wood and Sellars, of Manchester; Greenaway and Edwards, of Westminster; and Nicol and Nicol, of Birmingham. These were all in the final selection and highly commended by the assessor.

Whitechapel Art Gallery.—A new series of exhibitions will be inaugurated at this Gallery. Two hundred and fifty owners of pictures and painters have promised to lend one picture each year for the months of February and March, thus providing this East End Gallery with a substitute for a permanent collection, which will have the additional advantage of maintaining the interest of the public, owing to the fact that the collection changes each year.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

The querist's name and address must always be given, not necessarily for publication.

Deflection of Irregularly Loaded Girder.

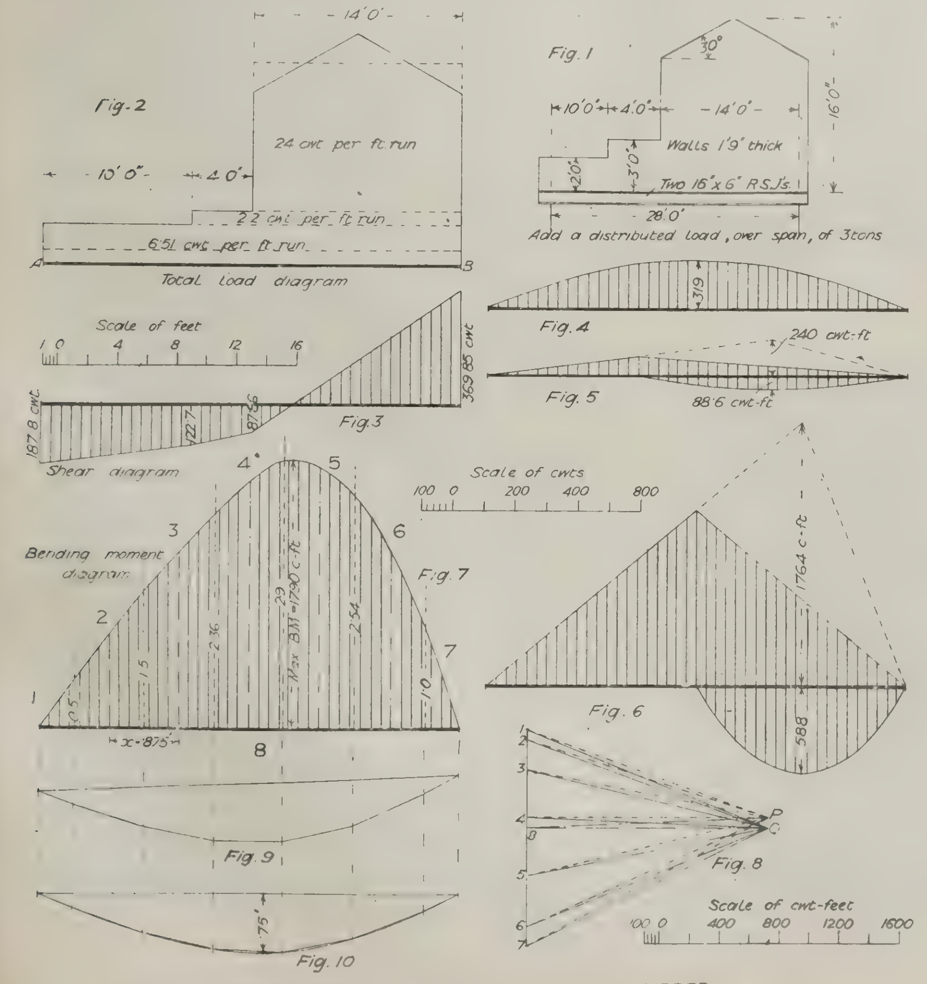
CARDIFF.—YENDIS writes: "Two steel joists support stone walls as shown by accompanying sketch. What is the greatest deflection, and the method of calculating it? I have obtained it approximately, but should be glad of a correct theoretical method."

Fig. 1 shows the case as given. Take the stone wall as weighing $1\frac{1}{4}$cwts. per ft. cube, then the total loading on the girder will be as shown in Fig. 2. The reaction at A will be $\frac{6{\cdot}51\times28}{2}+\frac{2{\cdot}2\times18\times9}{28}+\frac{24\times14\times7}{28}=91{\cdot}14+12{\cdot}64+84=187{\cdot}8$. The reaction at B will be $\frac{24\times14\times21}{28}+\frac{2{\cdot}2\times18\times19}{28}+\frac{6{\cdot}51\times28}{2}=252+26{\cdot}71+91{\cdot}14=369{\cdot}85$cwts.; together $187{\cdot}8+369{\cdot}85=557{\cdot}65$, which should equal the total load, $6{\cdot}51\times28+2{\cdot}2\times18+24\times14=182{\cdot}28+39{\cdot}37+336=557{\cdot}65$cwts., which agrees. The shear stress diagram, Fig. 3, will be obtained by joining the points found by the following values:—At A = reaction 187·8, then $187{\cdot}8-10\times6{\cdot}51=122{\cdot}7$ and $122{\cdot}7-4\,(6{\cdot}51+2{\cdot}2)=87{\cdot}86$, and $87{\cdot}86-14\,(6{\cdot}51+2{\cdot}2+24)=-369{\cdot}94$ at B, while the reaction at B was 369·85, the difference being due to the omission of decimals. The bending moments can be best obtained by dealing with the loads separately. Fig. 4 shows the bending moment due to the 6·51cwts. per ft. run, Fig. 5 those due to the 2·2cwts. per ft. run, and Fig. 6 those due to the 24cwts. per ft. run. Fig. 7 shows the combined bending moment diagram for all the loads, obtained by adding the others together. Next divide up the bending moment diagram, Fig. 7, into any convenient number of parts, x, shown by stroke-and-dot lines, and draw the dotted vertical line through the centre of each part. Then the length of this vertical multiplied by the distance x will give the approximate area of each part. Set these areas down as a load line in Fig. 8 and select any pole, P. Draw vectors and construct the funicular polygon, Fig. 9. Then, as the closing line A B must be horizontal, select a pole, O, in Fig. 8, in a horizontal line with point 8 on the load line, and construct the funicular polygon, Fig. 10. Draw a regular curve through the points and the maximum deflection will then be at point C, scaling 0·75in. Then, to calculate the true deflection, the formula $\delta=\frac{xdmn^3\mathrm{O}^2}{\mathrm{EI}}\times1728$ must be used, where x=width in inches of one of the parts on Fig. 7; d=actual depth in inches of Fig. 10; m=scale of tons used; n=scale of feet used; O=distance in inches from pole to load line in Fig. 8; E=12,500 tons per sq. in. as the modulus of elasticity of steel; I=sum of the vertical moments of inertia in inch-units of the two rolled steel joists (B.S.B.27). Then

$$\delta=\frac{{\cdot}875\times{\cdot}75\times12{\cdot}7\times5{\cdot}3^3\times3^2\times1728}{12500\times725\times2}=1{\cdot}085\text{in.},$$

which is the maximum deflection.

HENRY ADAMS.



DEFLECTION OF IRREGULARLY LOADED GIRDER.

Telephones.

LLANELLY.—J. J. writes: "Please show how to fix an electric telephone."

See "Telephones," by F. C. Allsop, price 3s.

Churches to Measure near New Southgate.

NEW SOUTHGATE.—X. writes: "Are there any churches within, say, five miles of this district, suitable to measure for the R.I.B.A. Intermediate examination?"

You will have to travel beyond the five-mile limit to reach any churches which can be profitably studied for the R.I.B.A. Intermediate examination. The best I know within easy reach of New Southgate are North Mimms and South Mimms, Herts. The former is a beautiful example of 14th-century work, and the western doorway would be an excellent subject. A plan and illustration of the church appear in Brandon's "Parish Churches." For further study an altogether wider radius must be chosen if a really profitable selection is sought.

E. G.

Books on Brickwork.

ALTON.—C. H. R. writes: "Are there any books on brickwork?"

"Bricklaying and Brickcutting," by H. W. Richards, price 3s. 6d. post free from our offices.

GEORGE DEVEY, ARCHITECT.

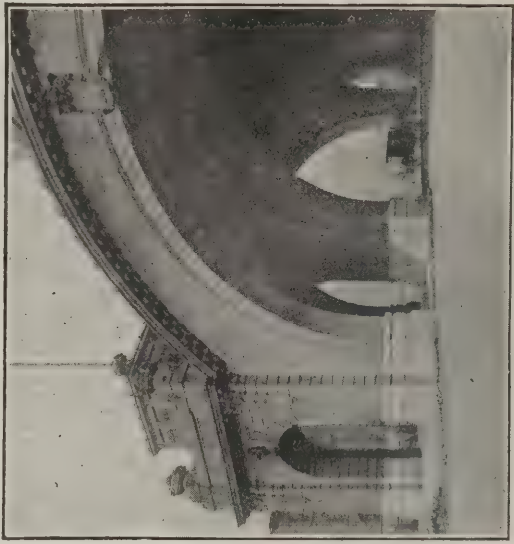
"The position occupied by the name of George Devey in the existing annals of English nineteenth-century architecture is not by any means the position which is the due of his high talent or of his vigorous originality. To those architects whose memory goes back to the sixties and the seventies his work is well known, and such men are unanimous in according to his taste and skill a very sincere recognition; but the younger generation is less well-informed concerning the man who did as much as anyone to foster the great development of domestic architecture, and who may be not unjustly considered the first to have started it in the direction of what is now regarded as unmistakably the 'best work.'" So writes Mr. W. H. Godfrey in his first article on the work of this architect which appears in the current issue of "The Architectural Review."

Amongst other important articles is one by Mr. Lawrence Weaver on "Lead Spires," illustrated by a splendid series of telephotographs.

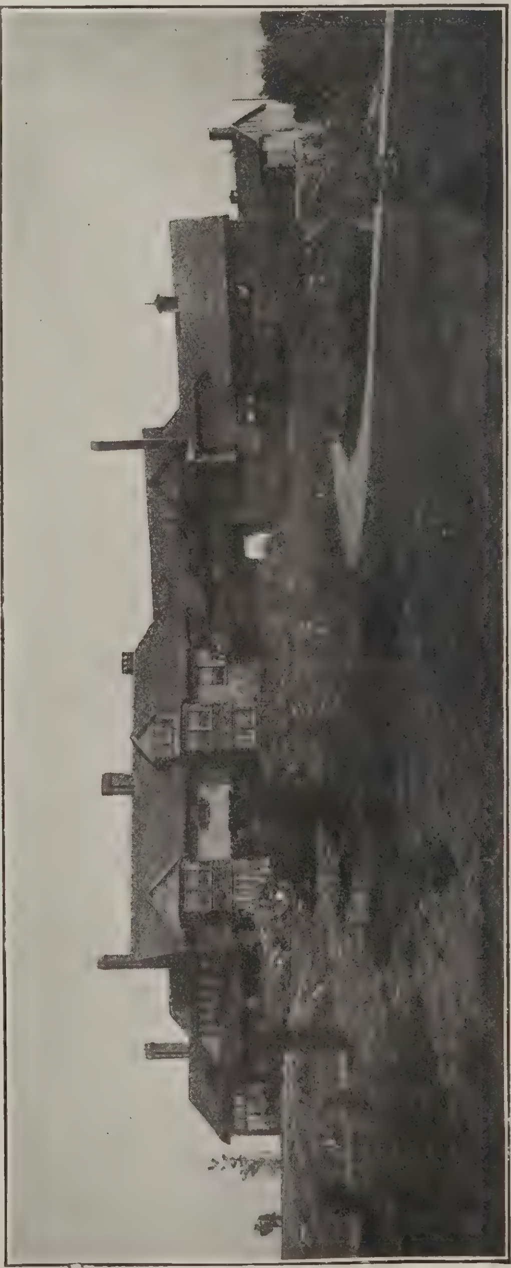
Mr. Lawrence Furniss contributes an interesting comparison between two reputed houses of Sir Christopher Wren in the City, which are illustrated by means of measured drawings and sketches.

The "Current Architecture" section is a prominent feature of the issue, the new Alliance Assurance building in St. James's Street, London (Mr. Norman Shaw and Mr. Ernest Newton, joint architects), the Bluecoat Hospital at Liverpool (Messrs. Briggs & Wolstenholme, F. B. Hobbs and Arnold Thornely, architects), and the County Hall, Northallerton (Mr. Walter H. Brierley, architect) being the principal items. There are also some illustrations of an interesting church by Mr. C. H. B. Quennell.

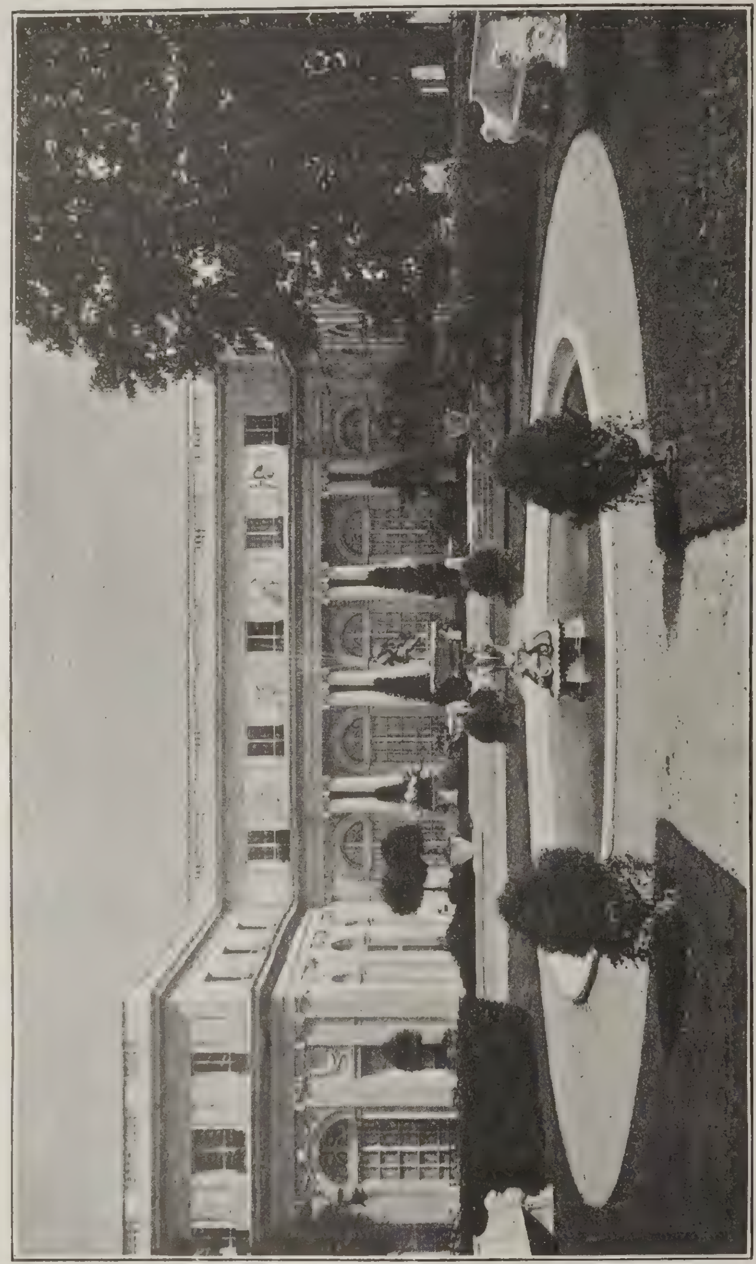
The Index to Vol. 24 of THE BUILDERS' JOURNAL *can be obtained from the Publisher, 6, Great New Street, E.C., post free 1d.*



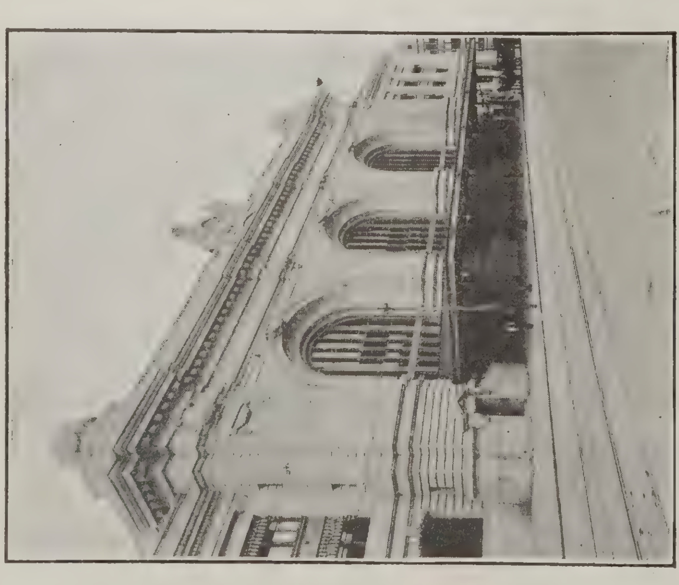
ENTRANCE ARCH, PITTSBURG STATION.
D. H. BURNHAM & CO., ARCHITECTS,



HOUSE NEAR BOSTON W. G. RANTOUL, ARCHITECT.



HOUSE AT NEWPORT. McKIM, MEAD & WHITE, ARCHITECTS.



RAILWAY STATION, ALBANY, N.Y.
SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS.

Law Cases

Three Workmen's Compensation Cases.—At Bow County Court last week a bricklayer named Clare was awarded £40 10s. as compensation for injury sustained by the fall of a brick from the upper floor of a stationmaster's house at Edmonton, on which Clare was employed.—At Birmingham County Court last week a bricklayer named Williams brought an action against Isaac Langley, of Tyburn, for £20 compensation for injuries sustained. The plaintiff's case was that he was working for the defendant on June 8th, the job being at Devereaux House, Coleshill. He and a number of other men were lifting an iron girder, weighing about 30cwts., into position in a billiard-room, which had been constructed at the house. Defendant's foreman, William Jones, was in charge of the operations, and he called out to Williams, who was standing at one end of the girder near the wall, "Can you go any further?" The plaintiff said he could not, but Jones shouted, "Another 6ins., lads." Thereupon Williams's leg was caught between the girder and the wall, and was injured. The defence was that the foreman did everything he possibly could in the superintendence of the work, and that there was no negligence on his part. The jury found for the plaintiff, awarding £9 5s. damages.—At Nottingham County Court on January 17th a builder's labourer named Baxter claimed compensation from W. T. Norris, builder and contractor, for personal injuries sustained in a fall caused by the breakage of some scaffolding. In giving judgment, his Honor Judge Allen, said: "The plaintiff, at the time of the accident, was employed as a bricklayer's labourer working on a scaffold on a semi-detached house, which constituted one of a set of houses in course of erection, consisting of Nos. 1 and 2, then a passage 3ft. wide, then a detached high house called No. 3, then a passage 3ft. wide, then another single detached house, No. 4, then a passage 3ft. wide, then a semi-detached house, Nos. 5 and 6. Nos. 5 and 6 had been at the time of the accident practically completed. No. 4 was over 30ft. high; Nos. 1 and 2 and No. 3 were under 30ft. high. It was contended that Nos. 1 and 2 and Nos. 3 and 4 were entirely surrounded by scaffolding, that the scaffolding went down both passages between 1 and 2 and 3 and between 3 and 4, and that the scaffolding in each passage was fastened into the walls of the houses, and that therefore the whole structure constituted one building, and that as part of it was over 30ft. high the plaintiff was entitled to an award. In my judgment this contention cannot prevail. . . . I do not think that, even if Nos. 1 to 4 had been joined together by scaffolding, that would have constituted them one building so as to enable the workman who was employed on Nos. 1 and 2, which were under 30ft. in height, to take advantage of the height of No. 4, which exceeded that limit. . . . Now, Nos. 5 and 6 were, so far as the plaintiff was concerned, completed, and No. 4 substantially so, although I think it is quite possible he might have had to carry some mortar to the house at a subsequent time; but I do not think that that would bring him within the Act, because at the time of the accident he could not, in my judgment, be said to be employed either on, or in, or about either Nos. 4 or 5 and 6, and these were the only two buildings that were over 30ft. high. I therefore find, as a fact, that he was not on, in, or about a building exceeding 30ft. in height, or in any employment to which the Act applies, and the claim accordingly, in my view, fails."

Claim for Damage Done during Alterations.—At the Lancaster County Court on January 18th Mr. Austin Cox sued Messrs. T. & J. Till, plasterers, Lancaster, for £50 damages, alleged to have been sustained through defendants' negligence. On November 21st last defendants were engaged to do some repairs at the "Bungalow," of which the plaintiff was the owner. It was alleged that in removing the concrete slabs of the balcony the defendants' workmen, acting contrary to the plaintiff's express instructions, caused holes in the Vulcanite and felting which formed the actual ceiling, and that in the course of a stormy night the wind and rain caused damage to the drawing-room, in respect of which the plaintiff had paid £50.—For the defendants it was contended that they appreciated the difficulty of taking up the concrete slabs, and it was in consequence of that they undertook to supply the men to act under plaintiff's responsibility, he being a professional architect. Liability was therefore repudiated by the defendants, for whom his Honour found a verdict, with costs.

Street Paving Costs: Important Decision.—On January 22nd the Leeds Stipendiary Magistrate delivered judgment in a case in which the Leeds Corporation sought to recover from Messrs. Joshua Tetley and Son, Ltd., of Hunslet Road, brewers, the sum of £234, being a share of expenses incurred in the paving and sewering of a private street. The defendants are owners of a plot of land situated at Chapel-Allerton, forming the site of "The Mexborough Arms." The western side of the property is bounded by a wall which abuts on a public footpath running from Chapeltown Road to Potternewton Lane. The footway, apparently an ancient highway, has been repaired by the Corporation for many years in their capacity of highway authorities. Two or three years ago the owners of the land which abuts on the other side of the footway commenced building operations, and laid out certain streets and roads, including a carriage road, alongside the footway throughout its whole length. The strip of land laid out as a carriage road, together with the ancient footpath, constitutes a street known as Blake Grove. In delivering judgment his Worship said the complainants raised an issue of great importance as to the true construction of Section 150 of the Public Health Act, 1875. It was beyond dispute that the street was a street within the meaning of the section, and it was abundantly clear, if not actually admitted, that the whole of the expenses incurred in the construction of Blake Grove might be recovered from adjoining owners. The only question was whether the burden should be borne by all or some only of such owners. The defendants had pleaded that their property abutted on the ancient footpath, which was repairable by the inhabitants at large, and not on the new street, and that where a strip of land was added for the purpose of widening a road already repairable by the inhabitants at large, the cost of paving, &c., should fall exclusively on the owners of the premises which actually abutted on the added strip—that was to say, on the owners of the property situate on the side on which the widening took place. His Worship held that the section meant that where a private street springs into existence the authority may apply the provisions of the section without being harassed by enquiries as to whether or not some portion of the new street may not happen to be the site of a public footpath, or bridle-way, or land which in some way or other has become repairable at public charges, and that the relative position of the newly-added strips to the part or parts of the street, hitherto repairable by the public, could not affect the nature or the incidence of liability. He therefore gave judgment for the Corporation for the amount claimed.

DECAY OF STONE AT CANTERBURY CATHEDRAL.

Replying to the Mayor of Canterbury's letter to the "Times" in regard to the decay of the stone in the Angel Tower of Canterbury Cathedral (see page 36 of our issue for last week), Mr. W. D. Caröe, the cathedral architect, says:—"Every expert in masonry is alive to the evil of face-bedding. In some qualities of stone the results are much more serious than in others, and Caen stone is by no means the worst of them. Unfortunately it is not the case that the medieval builders were careful to avoid face-bedding. Technically skilful as their masons were in the manipulation of stone, they were singularly careless, or often, I believe, ignorant, in this important particular. It is also a pure fiction that the Angel Tower at Canterbury was largely erected out of re-used material. A few of the Norman stones were re-used at its base, below the level of the Cathedral roofs. The rest was entirely constructed externally of new stone. The outcome is that certain portions of the stonework are indubitably face-bedded, and some decay is due to this fact. But the general and recent rapid decay have nothing whatever to do with face-bedding. The fact that stone which has stood in a purer atmosphere for hundreds of years is now beginning rapidly to disintegrate owing to a definite chemical change in its structure would seem to afford evidence enough of some fresh stress to convince the most incredulous. Chemical analysis proves to the hilt that the fresh stress is coal smoke. . . . The sporadic character of the decay depends upon the quality of each stone and its original position in the quarry. The long transport would naturally tend to mix up the stones from different parts of the quarry.

"It is interesting that not only at Canterbury, but elsewhere, the Caen stone used by the Normans was of superior quality to that imported later; in fact, at Canterbury it may be accepted as a general rule that the older the Caen stone the better its quality and condition. Of Lanfranc's stonework there is not, regrettably, much left to us, but what there is nappens to be fairly well protected. Yet after 800 years of sturdy existence, mostly in the purer air of the past, it is showing signs of giving way to modern conditions. It should be understood that good stone once set to the weather may erode (as, typically, at Stonehenge) under long exposure. It will not decay, after a long life, except under fresh influences.

We have, then, to face the disagreeable

fact that if the Angel Tower were standing in the open country it would remain to us nearly as perfect as it was when Goldstone fixed the last stone in 1503, and much more beautiful—mellowed by the clean hand of Time and by the slight and soft erosion of some of the face-bedded masonry. . . ."

Trade and Craft.

The "Limpet" Washers and Bolts.

Some weeks ago we drew attention to an iron roofing speciality, namely, "Limpet" washers and bolts. We have now received some further particulars from the managing agents, Messrs. William Jacks & Co., 5, East India Avenue, London, E.C. The "Limpet" washer and bolt has been patented in about 25 countries and was placed on the market in November, 1905, since when the sales have amounted to upwards of 53,000 gross, representing a gross weight of more than 70 tons. Notwithstanding a slightly increased cost, and also the tendency of some manufacturers to use cheap fittings, the "Limpet" is daily becoming more popular amongst structural engineers and firms of iron roof builders in this country and abroad. The "Limpet" has also found favour with architects and has been supplied, either through them or independently, for a large number of iron workshops and other buildings. In India and the Colonies the "Limpet" has almost entirely superseded the ordinary washer, not only in new work, but largely to replace the fittings on existing structures. Messrs. A. & J. Main & Co., structural engineers, Glasgow, control agencies in South Africa and India, and their reports, especially from India, are most favourable. In brief, the value of the two main features of the "Limpet" washer and bolt—preventing leakage and retarding corrosion—are found to be ample compensation for any extra cost entailed.

Coming Events.

Wednesday, January 30.

INSTITUTION OF CIVIL ENGINEERS.—Students' Visit to G.P.O. Telegraph Department.

SOCIETY OF ARTS.—Mr. James Parsons, M.A., on "Apprenticeship," at 8 p.m.

Monday, February 4.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.—President's Address to Students; Presentation of Prizes, at 8 p.m.

LIVERPOOL ARCHITECTURAL SOCIETY.—Mr. Geoffry Lucas, A.R.I.B.A., on "Inexpensive Cottages."

Tuesday, February 5.

ARCHITECTURAL ASSOCIATION OF IRELAND.—Mr. G. G. Lynes on "Water-Colour Sketching."

Wednesday, February 6.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Mr. A. R. Myers, A.R.I.B.A., M.R.S.I., on "Notes on Materials," at 8 p.m.

ARCHITECTURAL ASSOCIATION (Discussion Section).—Mr. T. L. Dale on "Architecture and the Public," at 7.30 p.m.

Thursday, February 7.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—Mr. W. H. Thorp, F.R.I.B.A., on "Villas and Gardens of Rome, Tivoli, and Frascati," at 6.30 p.m.

Friday, February 8.

ARCHITECTURAL ASSOCIATION.—Mr. Mervyn E. Macartney, F.R.I.B.A., on "Regent Street," at 7.30 p.m.

GLASGOW TECHNICAL COLLEGE ARCHITECTURAL CRAFTSMEN'S SOCIETY.—Mr. Archibald Scott, A.R.I.B.A., on "Foundations."

Saturday, February 9.

JUNIOR INSTITUTION OF ENGINEERS.—Anniversary dinner, Hotel Cecil.

Monday, February 11.

BRISTOL SOCIETY OF ARCHITECTS.—Mr. M. A. Green, A.R.I.B.A., on "The Growth of the Renaissance in Bath," at 8 p.m.

ROYAL SANITARY INSTITUTE.—Dr. J. Priestley on "Sanitary Law—A. (Introductory Remarks, Public Health Acts, By-Laws, &c.)," at 7 p.m.

Wednesday, February 13.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Mr. Barry Parker on "Town Planning," at 8 p.m.

ROYAL SANITARY INSTITUTE.—Dr. J. Priestley on "Sanitary Law—B. (Public Health Act, Metropolis Local Management Acts, London By-Laws)," at 7 p.m.

Thursday, February 14.

CARPENTERS' COMPANY.—Mr. Charles Welch on "Old and New London Bridge," Carpenters' Hall.

SOCIETY OF ARCHITECTS.—Mr. W. A. Scott, A.R.I.B.A., on "Byzantine Architecture," at 8 p.m.

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—Mr. J. R. Wigfull, A.R.I.B.A., on "Plasterwork."

Friday, February 15.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—Lecture to be announced.

ROYAL SANITARY INSTITUTE.—Dr. J. Priestley on "Sanitary Law—C. (Factory & Workshops Acts, Smoke Legislation, &c.)," at 7 p.m.

New London Buildings

At yesterday's meeting of the London County Council the Building Act Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics*:

Additional storey at No. 42a, Great Cumberland Place, St. Marylebone. (*Rescission of resolution.*)

Two cooling-towers on the south-western side of Burnard Place, Islington. (*Rescission of resolution.*)

One-storey shop in front of No. 399, Battersea Park Road, Battersea, to abut also upon Culvert Road, on the application of J. A. J. Woodward & Sons, on behalf of E. H. Disney. (*Consent.*)

Granary building on the southern side of High Street, Battersea, westward of the "Bricklayers' Arms" public-house, on the application of J. H. May, on behalf of A. F. Hall. (*Consent.*)

Addition at the western end of Christ Church, Christ Church Street, Chelsea, on the application of E. Geldart, on behalf of the Rev. J. P. Thompson. (*Consent.*)

Two houses on the site of No. 41, Nightingale Lane, Clapham, on the application of R. L. Freeman, on behalf of D. S. Whitcher. (*Consent.*)

Retention of a motor-car shed on the forecourt of No. 112, Finchley Road, Hampstead, on the application of J. D. Hunter. (*Consent.*)

Retention of a urinal erected in the yard of the "Two Brewers" public-house on the western side of Perry Hill, Catford, on the application of W. J. Janes, on behalf of E. J. Janes and Wooding & Cole. (*Consent.*)

Residential flats, with bay windows, upon the site of Nos. 79 to 105 (odd numbers only) inclusive, Park Road, Regent's Park, on the application of Sir Arthur Blomfield & Sons. Extension of period. (*Consent.*)

Retention of enclosures to the sides of an existing porch in front of No. 77, Gloucester Terrace, Paddington, on the application of W. Giles, on behalf of Miss F. A. Drew. (*Consent.*)

Retention of an addition over the portico to No. 38, Gloucester Square, Paddington, on the application of M. A. Spielmann. (*Consent.*)

Iron and glass shelter in front of the main entrance to the "Playhouse" Theatre, Northumberland Avenue, Strand, on the application of Blow & Billerey, on behalf of Cyril Maude. (*Consent.*)

Projecting illuminated sign over the shelter at the main entrance to the "Playhouse" Theatre, Northumberland Avenue, Strand, on the application of E. Wingfield-Bowles, on behalf of Cyril Maude. (*Consent.*)

Projecting oriel window in front of No. 106, Jermyn Street, Strand, in connection with the application of Treadwell & Martin, on behalf of F. C. Wall. (*Consent.*)

Retention of an iron and glass covered way at North Hall, Mortimer Road, Kilburn, on the application of T. Stevens, on behalf of A. Blacklock. (*Refusal.*)

Additions in front of Nos. 90, 92, 96, 98 and 100, Brady Street, Whitechapel, on the application of J. Holmes. (*Refusal.*)

Building on the site of No. 19, Wagner Street, Peckham, on the application of J. Webster, on behalf of T. O. King. (*Consent.*)

Building on the southern side of George's Road, Islington, to abut also upon the eastern side of Adam's Place, on the application of G. H. Lovegrove, on behalf of J. Pinchbeck. (*Refusal.*)

External iron gangway and an external iron staircase at the premises of E. Roberts, Ltd., No. 264, Camberwell Road, Camberwell, on the application of Weatherall & Green, on behalf of Captain Harcourt Wood. (*Consent.*)

Buildings on the north-western side of a footway leading from Lexham Gardens to Cornwall Gardens, Kensington, in connection with the application of D. Young. (*Consent.*)

Additional house at the north-western end of Belford Grove, on the application of F. C. Henesy. (*Consent.*)

Buildings on the site of Nos. 8 to 14, Wild Court, Holborn, on the application of A. B. Brown. Extension of period. (*Consent.*)

Formation or laying out of a new street to be used partly for foot traffic only, and partly for carriage traffic, in continuation southward of Rivaz Place Chatham Place, Hackney, and connecting Rivaz Place with Retreat Place, on the application of Hodson & Whitehead, on behalf of Hodson & Rowlandson, and Fielder, Jones & Fielder. (*Consent.*)

Formation of roadway of a proposed street for carriage traffic, to lead from Fulham Palace Road to Colehill Lane, Fulham, on the application of A. Blackford. Extension of time. (*Consent.*)

Buildings abutting upon a proposed street to lead from Fulham Palace Road to Colehill Lane, Fulham, and exceeding in height the width of the street, on the application of A. Blackford. (*Consent.*)

Current Market Prices.

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	106	15	0	107	0	0
Do. Strong sheets ...	do.	123	0	0	124	0	0
Lead, soft foreign	do.	19	17	6	19	18	6
Do. English	do.	20	2	6	20	5	0
Do. pipes...	do.	23	0	0	23	5	0
Do. sheets	do.	22	12	6	22	15	0
Galvanised Corrugated sheets	do.	13	17	6	14	2	6
Spelter G. M.	do.	27	5	0	27	7	6
Angles, Scotland	do	7	0	0	7	2	6
Bars, do.	do.	7	15	0	7	17	6
Marked bars, Staffs. ...	do.	8	17	6	9	0	0
Common bars, do. ...	do.	7	5	0	7	7	6
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	10	0	6	15	0
Angles, Midlands	do.	7	0	0	7	2	6
Joists do.	do.	7	2	6	7	5	0
Girder plates, Midlands ...	do.	7	15	0	7	17	6
Angles, Foreign, c.i.f. Thames	do.	7	13	6	7	15	0
Tees do. do. do.	do.	7	16	6	7	18	6
Joists, do. do. do.	do.	6	7	6	6	10	0
Channels do. do. do.	do.	6	10	0	6	15	0
Plates do. do. do.	do.	7	10	0	7	12	6
Tin, Foreign	do.	192	5	0	192	15	0
Do. English ingots ...	do.	194	0	0	195	0	0
Zinc, sheets, Silesian ...	do.	31	10	0	32	0	0
Do. do. V.M. ...	do.	31	10	0	32	0	0

TIMBER.

		£	s.	d.	£	s.	d.
Deals Attu (Abo), Yellow & White, Inf. 5th, 2½×7	per std.	8	10	0	—		
Do. Archangel, Yellow, 3rd, 3×9	do.	10	10	0	11	0	0
Do. do. do. do. 3×8	do.	10	0	0	—		
Do. Asbacka, Yellow, 4th, 3×9	do.	10	10	0	—		
Do. Carlsvik (Sundswall), Yellow, unsorted, 2½×7	do.	10	0	0	—		
Do. Hallsta, Yellow, unsorted, 2½×8	do.	9	5	0	—		
Do. Ingramport, Yellow, unsorted, 5×10	do.	6	0	0	—		
Do. Mesane, Yellow, 3rd, 3×9	do.	10	10	0	10	15	0
Do. Norrkoping, Yellow 1st. 3×11	do.	11	10	0	—		
Do, Norrsundet, Yellow, unsorted, 3×5	do.	9	5	0	—		
Do. St. Petersburg, Yellow, 3rd, 3×9	do.	8	10	0	—		
Do. do. White, 3rd, 3×9	do.	9	0	0	—		
Do. do. do. do. 3×7	do.	8	5	0	—		
Do. do. do. do 2½×7	do.	8	15	0	—		
Do. Skelleftea, Yellow, 1st, 3×9	do.	10	15	0	—		
Do. Wyburg, Yellow, unsorted, 3×4	do.	9	5	0	—		
Do. do. do. do. 2½×7	do.	9	15	0	—		
Battens, Archangel, Yellow, 2nd, 2½×6	do.	11	5	0	—		
Do. do. do. do. 2×9	do.	16	10	0	—		
Do. Attu (Abo), Yellow, 2×8	do.	8	10	0	—		
Do. Batskarsnas, Yellow, 2nd, 2×9	do.	9	10	0	—		
Do. Carlsvik, Yellow, 4th, 2×9	do.	10	10	0	—		
Do. do. do. 5th, 2×9	do.	9	10	0	—		
Do. do. do. unsorted, 2×8	do.	10	0	0	—		
Do. St. Petersburg, White, 3rd, 2×7	do.	8	10	0	—		
Do. do. do. do. 2×6	do.	8	5	0	—		
Do. Wyburg, Yellow, unsorted, 2×7	do.	9	10	0	—		
Flooring Boards, Fredrikstad, Yellow and White, 1¼×7	do.	0	9	9	—		
Do. do. do. 1×7	do.	0	8	6	—		
Do. do. do. 1×6½	do.	0	8	9	—		
Do. do. do. 1×6	do.	0	8	3	—		
Do. do. do. 1×5½	do.	0	8	0	—		
Do. do. Yellow, unsorted, 1×6	do.	0	9	9	—		
Do. do. do. do. 1×5	do.	0	9	3	—		
Do. Gefle, Yellow, 1st, 1¼×7	do.	0	15	3	0	18	3
Do. do. do. do. 1¼×6	do.	0	14	6	—		
Do. do. do. do. 1×7	do.	0	12	0	0	13	0
Do. do. do. do. 1×6	do.	0	11	6	—		
Do. do. do. 2nd, 1×7	do.	0	11	9	—		
Do. do. do. do. 1×6	do.	0	11	0	—		
Do. do. do. do. 1×5½	do.	0	10	6	—		
Do. do. do. do. 1×5	do.	0	9	9	0	10	3
Do. Mon, Yellow, 2nd, 1×6	do.	0	11	3	—		
Do. Skonvik, Yellow, 3rd, 1¼×7	do.	0	12	6	—		

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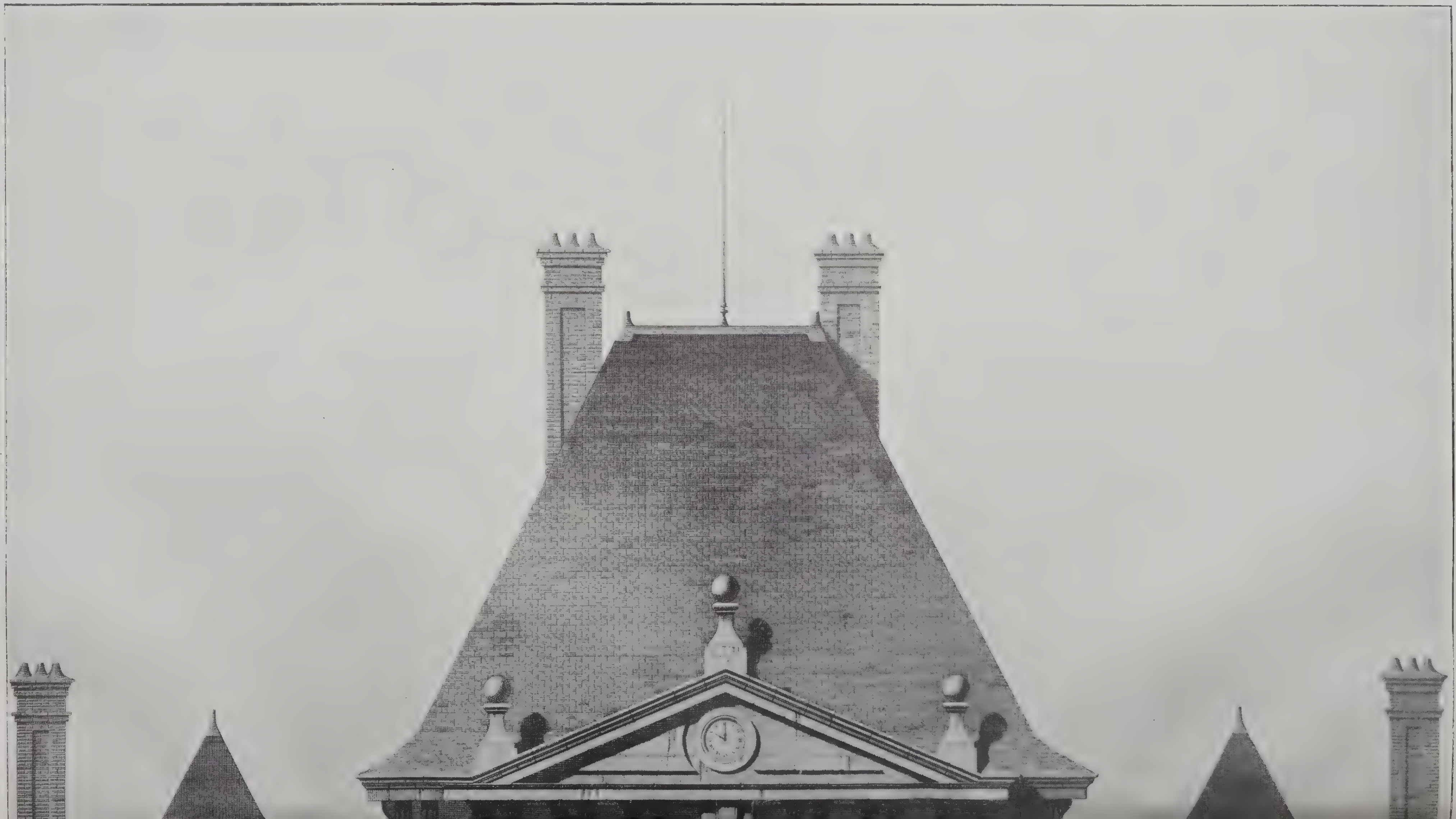
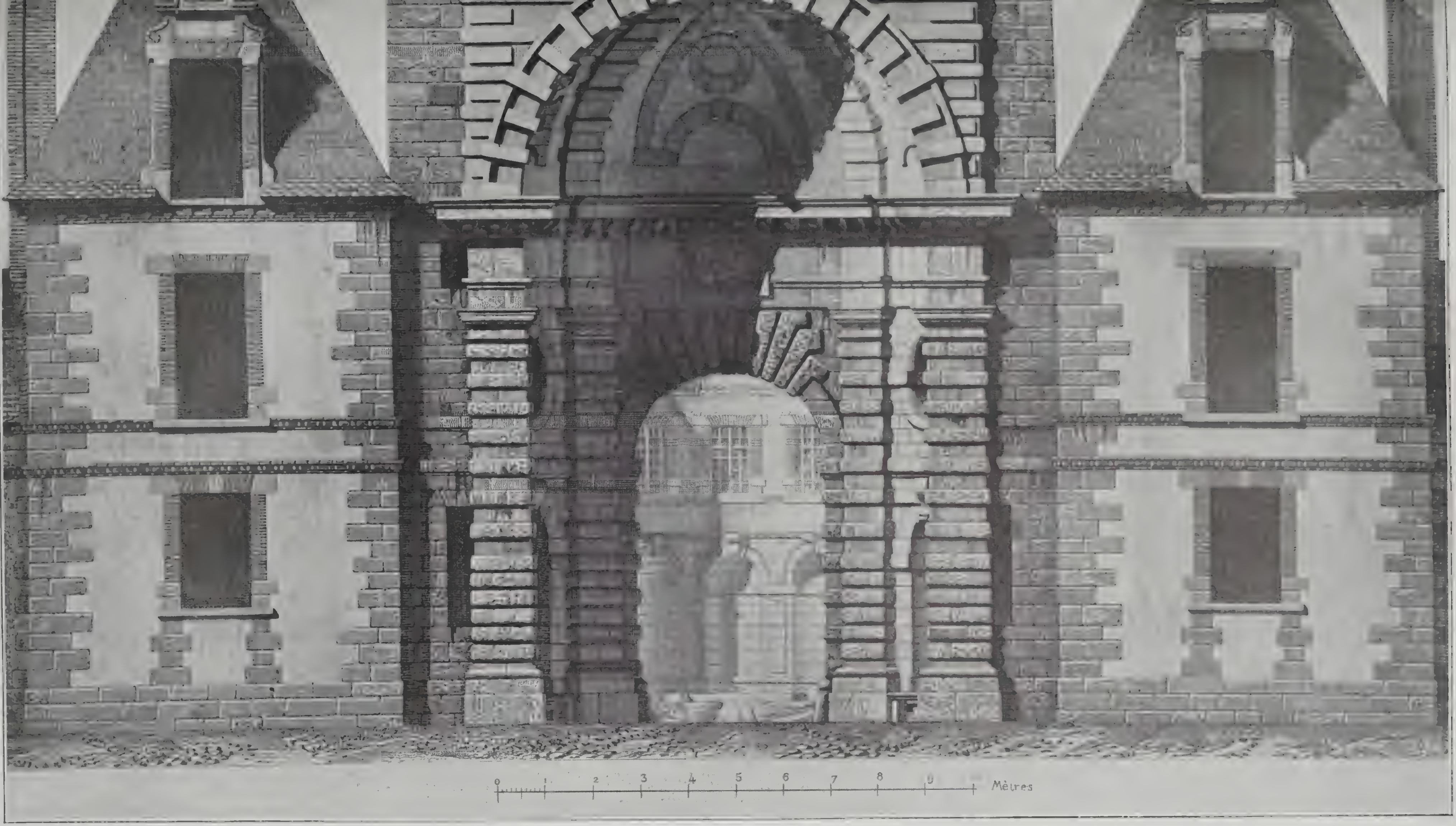
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, February 6th, 1907.





FONTAINEBLEAU: CENTRAL PAVILION, FACING PLACE D'ARMES: ENTRANCE TO THE COURT OF HENRY VI.

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February 6, 1907. Volume 25, No. 626.

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

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The Decoration of the House of Lords. THE evidence given by various experts before the Select Committee of the House of Lords appointed to enquire and report on the unfinished condition of the rooms in the House has just been published as a blue book. There was some remarkable difference of opinion between the various witnesses, and some interesting points came up for consideration. It is no secret of course that pure frescoes have been an absolute failure in the Palace of Westminster, and those that still remain in anything like passable condition owe their existence largely to the efforts of Prof. Church. Four main questions were put to the witnesses as to the respective merits of painting, mosaic, tapestry and architectural treatment for filling various panels and spaces in the different rooms. "Architectural treatment" was understood to be a convenient term for panelling, &c. A great deal of the evidence was purely technical, and dealt with the various processes for mural paintings. It was agreed that pure fresco was impossible in London, but there were diverse opinions on the respective merits of the water-glass process, the tempera method, and the method in which spike oil is used, which last was adopted for the panels at the Royal Exchange. There was a general agreement among those artists who had had experience of this method that it was the best that could be devised for London work. Prof. Lethaby favoured the claims of tapestry, his opinion being that the rooms were too bare and cold; he was supported in this by Mr. Sydney C. Cockerell. Mr. Lethaby was questioned rather closely on the probable life of tapestry, and the possibility of obtaining good tapestry at the present day. He suggested in answer to the latter enquiry that Morris's tapestry school was still in existence. Prof. Church, however, gave a very unsatisfactory account of the action of the sulphurous London atmosphere upon tapestry, and suggested that the only way to preserve it was by waterproofing, but this could not be done until the tapestry was completed, and it might then affect the colours. In no case was any favourable opinion given for a further "architectural treatment." It was generally accepted that Sir Charles Barry had divided up the wall space for paintings, and these only were required to complete the scheme of decoration. One or two of the painters who gave evidence did not appear to think that stained glass would handicap the mural paintings. But Mr. T. G. Jackson, R.A., took the opposite view, and thought that, if anything, there was too much architecture in the decoration at present; and that the mural paintings would be very much injured by the coloured lights from the stained glass. Prof. Moira's evidence was interesting, as he volunteered the opinion "that the whole of the Royal Exchange decoration is a mass of incongruity." Asked to explain further, he said: "It was just as bad as a picture gallery; you see certain pictures quite close together, with the result that the whole effect is disastrous." Mr. E. A. Abbey pinned his faith to spirit fresco, while Sir William Richmond expressed his belief in tempera, using yolk of egg. So much for the views of "the big men." They are very divergent, but make useful reading, and everyone contemplating mural painting schemes should not fail to see this blue-book.

New, True, or Neither

Last week I was rewarded for my searches in the editors' waste paper basket by finding a letter from one of those young architects "struggling for recognition" who were referred to in such lachrymose language by the proposer of a late resolution at the Institute. It appears that when this unlucky one was at the house of a prospective client a lady visitor said:—"I hope you never put those whirligig things on the stairs. An aunt of mine caught her dress in one, and fell and broke her leg." Our friend, the struggler for recognition, asks how he should reply to such remarks as these. I would recommend him to adopt the method of repartee approved in the early part of the last century. Let him reply thus:—"Madam, you encourage me to believe that the legs of all members of your family are well worth the breaking!"

* * *

Some people have an unpleasant way of putting things. Even if Alderman Saint was of opinion that quite enough expense had been incurred on the new library in North Islington, surely it was hardly necessary for him to add, at last week's meeting of the Islington Borough Council, that "there were still certain little matters outstanding, such as a constant supply of 2ins. of water in the cellar, and other things."

* * *

In giving an illustration of the black-and-white cottage recently uncovered at Macclesfield, the "Manchester Daily Dispatch" described it as "Early English" (with two capital E's). The "Guardian," better informed, called it "magpie," the term commonly used in Cheshire. This use of the term "Early English" to describe half-timbered buildings is very common and very confusing, but the man in the street persists in sticking to it.

* * *

The terminology of architecture is a great stumbling block to the general public. When the writer of this was at a public school, the School Chapel was beautified by the addition of a reredos. The following query was put to him, as he was leaving the school gates, by a passer-by:—"Can you tell me if I can see the new reredos, I hear *they* are very fine?" To which the reply "If you go in now you will find the architect there. He reredid it."

* * *

Church Congresses with their tender care for the architectural education of the clergy will doubtless spread some knowledge of the history of buildings in due time, but in the meanwhile there seem to be some clerics who leave something to be desired. The present writer rambling once in the country went into a brand new church of a very emphatic Early English type. On complimenting the vicar, who happened to be in the church, on the excellence of his building, the following was the answer :—" Yes, oh very fine architecturally, most highly thought of by connoisseurs; Perpendicular, you know, with a *touch* of Gothic."

How is this for "terminological inexactitude"?

* * *

Even unpopularity has its uses. Two professional men had been at enmity. Very unfortunate, but it does happen. "A" was a member of a distinguished learned society, but was very unpopular there. "B" desired to join the same society, was duly proposed and well supported. Now "A" did not love "B," and a friend of "A" was consequently amazed to see him signing the candidates' book in support of "B." "Surely, my dear 'A,' you must be very charitable to support a man whom you so dislike"; to which the reply, "Don't you see that when the members see that I am supporting 'B' they will inevitably blackball him?" And they did. "A" is still smiling. THE LOOKER-ON.

OUR COMPETITION.

A few weeks ago we promoted a competition for suggestions as to how the circulation of THE BUILDERS' JOURNAL might be increased. In publishing the results of this competition in our issue for January 16th we referred to the fact that we had received a great many suggestions, and that we were maturing our plans and would begin a competition in this issue. We stated then that it appeared to be the opinion of many readers that competitions provided a very promising means of increasing our circulation, while at the same time they formed interesting features in themselves. It is the general consensus of opinion that a competition should not be of too arduous a character, requiring much time to be spent upon it. The competitions suggested by our readers consisted either of those setting easy tasks in the way of simple architectural designs, or of those forming an interesting recreation rather than a direct means of instruction. We are ourselves of the opinion that a competition promoted by a paper for architectural designs should either be a means of instruction or an opportunity for younger men to put their technical knowledge to a practical test. Not being on the same plane as a competition for a building actually to be executed, such a competition should not require the devotion of much time to it: otherwise the criticism often made respecting the waste of time in ordinary public competitions would apply with double force. Although there is in public competitions a good deal of speculation, which results in much waste of time and labour without any return, the advantages perhaps more than counterbalance the disadvantages, for the public competition is for a building to be actually executed; it has the additional merit of serving to encourage young men, giving them the opportunity to measure their strength against established architects, as well as bringing notoriety and practice to the winner. A competition promoted by a newspaper for the best design for a complete building, or a portion of a building, never to be carried out is often an unfair task for a reward.

In the past we have promoted designing competitions suitable for students and rising architects, and we hope to do more of this in the future, but we think there is good reason in the proffered suggestion that a competition would be far more popular if it combined recreation with instruction. This proposal, too, seems to us more likely to fulfil the idea we have in mind, which is simply and solely to increase the circulation of THE BUILDERS' JOURNAL. The contents of the journal are such that many thousands of members of the architectural profession and the building trades already welcome it heartily each week, and we feel certain that others only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The competition we now promote will be known as the "Architectural dis-Orders Competition." This, while it is recreative, will serve to test competitors' knowledge of architecture and building construction, and, consequently, we think all will recognise that it has a distinct intrinsic value apart from its recreative aspect. The task set in this competition is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

We desire to attract the attention of those more directly concerned with building as well as those who belong to the architectural profession. We do not wish to favour either the architect or the builder, or the student of architecture or of building. There are many persons of course who have knowledge enough to be able to stand a good chance of correctly discovering the errors in all the pictures we shall publish, but our ordinary readers, to whom we wish to make this competition attractive, belong either to the architectural profession or to the building trade. We have, therefore, divided the competition into two parts—the first appealing mostly to students and practitioners of architecture and the second more especially to those practically engaged in constructional work. The most valuable prize will be given for the highest number of correct solutions of all the pictures in both divisions, but the rest of the prizes will be allocated to two classes, so that every reader will stand a fair chance of winning a prize—*i.e.*, there will be no privileged class.

The pictures will be published each week for 26 weeks in THE BUILDERS' JOURNAL, and competitors may send in as many sets of solutions for either division, or for both, as they please. The conditions of the competition will be found below.

As regards division A (architecture) we would call attention to the fact that a number of the questions will directly relate to the Orders of architecture, these being wrongly drawn in some way or other. A great many mistakes are constantly being made by draughtsmen and others in setting out the Orders, which, if we must have them, at least should be correctly drawn, and, consequently, we feel that the questions that will be set in this way will serve to call attention to this fact and form a corrective. This is a matter distinctly within the province of the student of architecture, and we have found much interest attracted by the series of articles which we recently published dealing with the Orders, under the title of "Practical Notes for Architectural Draughtsmen," by Messrs. Alfred W. S. Cross and Alan E. Munby. In solving the questions these articles and plates will be found very useful. To those who do not possess the numbers containing the articles, and who desire to do so, we may mention that the plates and explanatory matter are being republished in separate form for use on the drawing-board, and can be obtained from our offices. We think it is quite possible for anyone without an advanced knowledge of architecture to be able to answer the questions in this division by the aid of these plates on the Orders.

On the next page we give the correct solutions to two pictures, one in each division, so as to show the kind of answer required. No extended account of an error will be required as an answer, but in judging we shall, of course, pay regard to the manner in which the answer is given. For instance, with reference to the two pictures to which specimen answers are given, it would not be sufficient to say in the case of one "spire," and in the case of the other "sash," or "sash wrong." In each case it must be stated how it is wrong.

THE PRIZES.

£20, and 50 other valuable prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions to the question "What is wrong?" in relation to each of the drawings published in the "Architectural dis-Orders Competition." The winner, or winners, of this special prize will not be eligible for any of the other prizes offered.

The remainder of the prizes are divided into two classes, as follows :—

Class A (Architecture).

1st Prize.—£10.

2nd Prize.—Morocco leather pocket case of German silver instruments, comprising 5-in. steel-jointed, sector-jointed compass, with double knee-joints, hair spring attached to the divider leg of compass, nut and bolt needle points, pen and pencil legs, lengthening bar, set of three spring bows, ruling pen, case of leads and compass key.

3rd Prize.—Leather case of instruments, containing 4-in. German silver bow compass, hinged pen and pencil points, combination compass key, needle or lead holder, and handle to take pen or pencil leg.

4th Prize.—Leather case of beam compasses, with tangent screw adjustment, and needle points (electrum).

5th Prize.—Architect's drawing board of best seasoned pine, grooved, with mahogany battens, brass slots and screws to allow of contraction. One edge inlaid with ebony. Size 28ins. by 21ins.

6th Prize.—A morocco pocket case containing an English set of three spring bows, with steel heads and steel points (divider, pen and pencil).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, cloth covered, snap fastening, containing 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

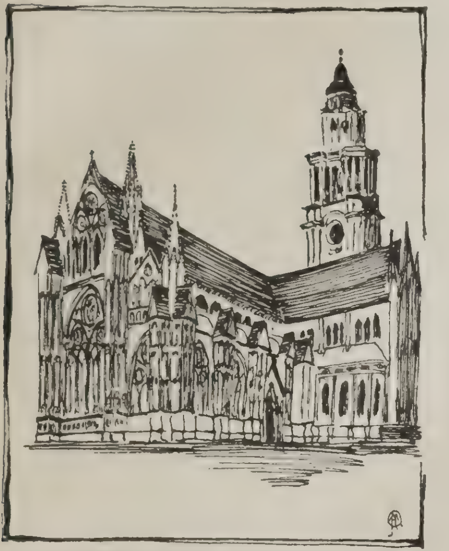
9th Prize.—A brass proportional compass, 6-in., partly divided.

ARCHITECTURAL DIS-ORDERS COMPETITION.

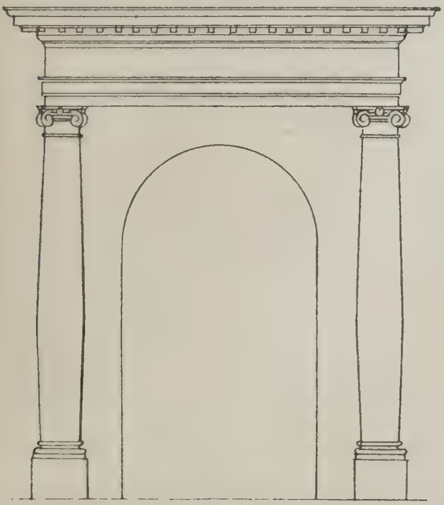
COUPON, Class A (Architecture).

BUILDERS' JOURNAL, *February 6th, 1906.*

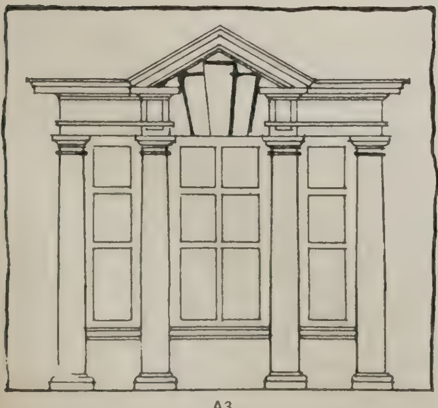
CLASS A (ARCHITECTURE).



A1.—RENAISSANCE SPIRE ON GOTHIC CHURCH.
(Specimen Answer.)



A2.



A3.

10th Prize.—A pocket divider, electrum, with sheath or point-guard screwing on and loop at the end.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case, forming a series of most useful scales for practical draughtsmen and for all engaged in engineering and building construction.

Class B (Building).

1st Prize.—£10.

2nd Prize.—Abney level in morocco case, with 5-in. rack and vernier.

3rd Prize.—Best English-made electrum *Napier* pocket compass, needle-pointed.

4th Prize.—A drawing set, comprising drawing-board (size 23ins. by 16ins.), 24-in. T-square, 2 large set-squares, 12 drawing pins, and set of instruments in rosewood hook case, comprising 4-in. brass divider, needle-pointed compass with pen and pencil points, bar, patent pencil point, box of leads, slip rule, and pencil holder.

5th Prize.—A pair of builder's rods, spring-jointed.

6th Prize.—A pair of builder's rods (not jointed).

7th Prize.—A patent metallic wind-up measuring-tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, cloth covered, snap fastening, containing 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

9th Prize.—Spirit level, 15ins., brass-faced, best finish.

10th Prize.—2-ft. fold-up boxwood rule, brass-jointed, fully divided, 4 bevels.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

The Conditions

of the "Architectural dis-Orders Competition" are as follows:—

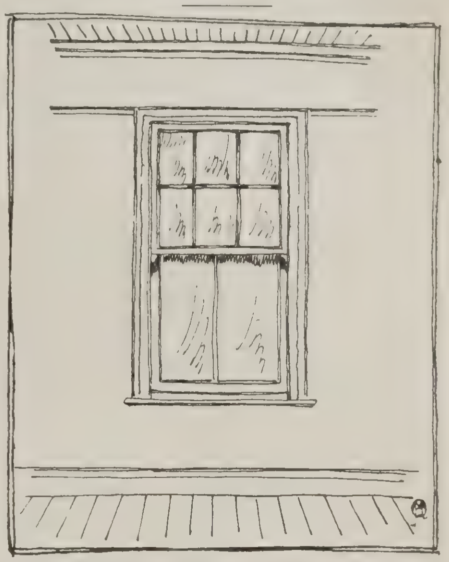
1. Solutions must be retained and sent in when the publication of the drawings is concluded
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

ARCHITECTURAL DIS-ORDERS COMPETITION.

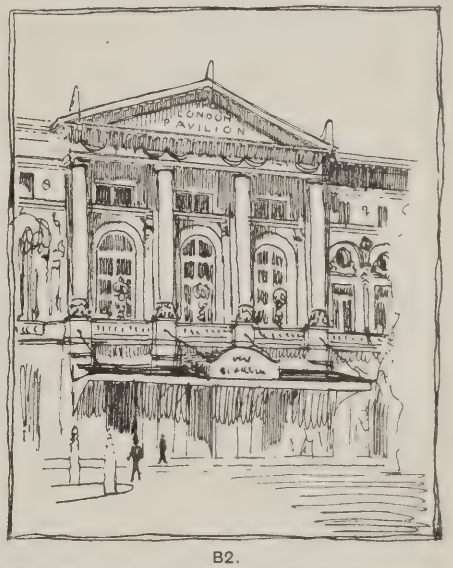
COUPON, Class B (Building).

BUILDERS' JOURNAL, *February, 6th, 1906.*

CLASS B (BUILDING).



B1.—THE SASHES ARE WRONGLY HUNG.



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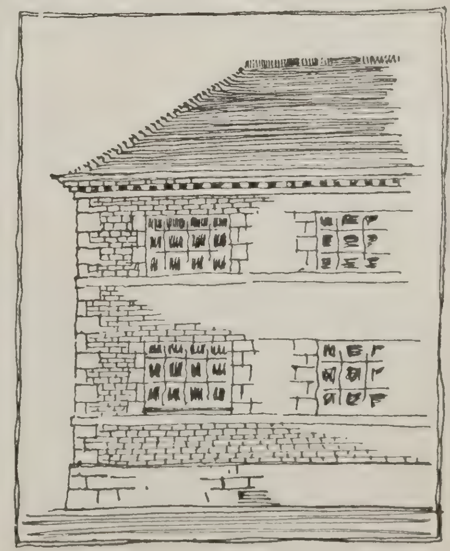


B3.

R.I.B.A.

President's Address to Students.

A meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W., the chair being occupied by the president, Mr. T. E. Collcutt.

It was announced that Mr. John Belcher, A.R.A., had been selected by the Council as the recipient of the Royal Gold Medal.

Mr. Collcutt then delivered his address to students. He said:—

In the first place I wish to impress upon you the importance of fully considering whether the career you have chosen is your proper vocation. It is essential to be sure that you have.

not a mere inclination

for your art, but that you feel for it such a love and reverence as will enable you to overcome serious difficulties. If after a period of work in the schools you find that your interest is not sustained, and that your labour becomes irksome, then I would advise you to consider seriously whether some other career would not offer more attraction and interest to you. Nevertheless, do not be easily discouraged. Remember that in all callings, even in the highest, there is a certain amount of drudgery and uninteresting work to be faced before one is qualified for the more pleasant studies which follow.

The Importance of Draughtsmanship.

It is not within the province of such an address as this to dictate the course of study you should pursue. This has already been efficiently done by the Architectural School and by the Board of Architectural Education. However, I may remark that a student cannot pay too much attention to the acquirement of draughtsmanship. In particular I would advise that perspective be very thoroughly learnt. To design well is to think in perspective; to be able to think in perspective one must have a sound knowledge of its principles.

Again, I would advise constant practice in sketching from still life.

But always remember this: all your skill and accomplishment as draughtsmen, whether merely in geometrical or perspective work, or in the artistic representation of sculpture and carving, is only a means to an end. Do not forget that much of the great work of the world has been achieved without the aid of drawing; that is to say, without that quality of drawing which in the present day we are obliged to consider an essential to the complete education of the architect; for example, the drawings that we suppose to have been executed by Wren will not bear comparison with the work that we ordinarily expect from an advanced student.

The geometrical work of Wren

was no doubt correct, but, according to the standards of the present time, it was certainly ill-drawn. Although there is evidence that he could very clearly indicate the carving he thought desirable, yet these indications would scarcely pass muster as really good drawings. I do not lay stress on this point as an excuse for slovenly and bad drawing. Good draughtsmanship is, as I say, necessary nowadays; but I wish to warn you emphatically against the temptation of thinking that pretty drawings are essential to good architecture.

The Study of the Styles.

In studying the ancient, the medieval and the later styles of architecture, I would advise separate study of each period as far as possible. Make a thorough study of the Greek, the Byzantine, and following styles, taking as examples some well-recognised buildings, but bearing in mind that no buildings can be fully appreciated from mere illustrations, however well executed these may be. To gain even an approximate idea of what inspired the ancients and our more immediate forefathers you must see for yourselves the monuments they have left for our wonder and admiration.

I may mention here my own experience in this direction. Although I was fairly familiar with the Doric Order as exemplified in the Parthenon, yet it was not until I had actually seen the building that I was able fully to appreciate and understand the wonder of this work, to my mind the simplest as it is the most beautiful of all the Greek masterpieces.

Although from books and drawings one may be perfectly familiar with the general lines and proportions of the Parthenon, yet one does not fully appreciate or understand the wonder of the work unless one has seen the actual building.

The Parthenon

seems to me to embody perfection of line. The entasis of its component parts, the columns and the steps are perfect, and one feels that even such details as the curve and width of the flutings could not be altered by the fraction of an inch without damaging the proportions. The very dimensions of the building could not be altered without detriment.

I am not advising you to study Greek work so that you may erect Greek buildings in England, but so that you may attain some notion of the motives and ethics that influenced Greek architects and sculptors. It is very questionable whether Greek architecture is suitable to our climate, and to the conditions of modern life and thought. In our country it tends to become "faultily faultless, icily regular, splendidly null." Think of the Parthenon with its colour, its workmanship, and its setting of blue sky and clear atmosphere; and then look at the Doric portico to Euston Square Station. Neither its material, its colour, nor its size is satisfactory. With regard to material, the stone employed is not sufficiently delicate in colour or in texture to obtain the true proportion of light and shade, especially to the flutings. The diameter of the columns, and therefore the whole structure, is greatly in excess of any known ancient examples, and one cannot but believe the Greeks had determined the limit of magnitude for work in this order.

I am afraid I am enlarging my discourse into a lecture; but I wish to impress upon you the necessity of acquiring

a Sense of Proportion,

and the only way to do this is to approach in a spirit of reverence the great works that have appealed to successive generations, and that are universally acknowledged to be masterpieces. Do not, at any rate to begin with, criticise too freely the works of art that have been established as pre-eminent by the verdict of expert opinion in ages past and present. Take this verdict for granted, and then study these great works by drawing and by contemplation, and try to understand wherein lies the excellence of their proportion, of their detail, and of their general massing.

Influence of Materials.

In giving your attention to the old masterpieces, do not omit to observe very carefully the materials in which they are built, for this is of the utmost importance. The student should not only make himself thoroughly familiar with the right use of materials, but he should be sure to realise the great influence that these have upon style. He should also compare the varying qualities of workmanship. Ruskin, I think, has somewhere made the assertion that perfection is not always desirable. An illustration of this theory may be found in comparing the perfection of the Greek Doric workmanship with the roughness and unevenness of the porphyry and other columns in Sta. Sophia at Constantinople. In the latter case, perfection, I think, would have been fatal; the very unevenness of the surface of the columns gives additional charm. I will venture to uphold the theory that excellence of workmanship as regards exterior finish is altogether desirable for any architecture founded on the Classic, but that very high finish is not always desirable in Byzantine and medieval work. In most old examples it is not met with.

Let me counsel you, when you have made some progress in the study of a particular style, to practise design in that style; but I must warn you to avoid efforts after originality. A strong personality will inevitably assert itself sooner or later, but do not force it. There is nothing new under the sun, and it may safely be said of any too "original" kind of building that it has been done as badly before.

An Architect's Knowledge.

Besides the fine art of architecture and the art of construction, there are many subjects with which the architect must have more than a casual acquaintance. Although experts may be consulted on steel construction, sanitary work, electrical work, and heating, yet the young architect should endeavour to become master of the principles involved in such matters as these. It is also very important for the student to have some knowledge of the sister arts of painting and sculpture, and under proper guidance to study the old masters. He should know something of the history of painting, and should be able to trace the gradual development of colour-decoration from early work, such as the Byzantine mosaics, to the culminating point of colour-decoration as exemplified in the pictures of the Italian Renaissance. Let him also study sculpture, and let him not neglect the lesser arts: furniture, porcelain, needlework, tapestry—in fact every department of the fine arts—should be considered.

In conclusion, let me say how great has been my pleasure in addressing you to-night. You are starting on your careers; I may be considered as having entered on the last stage of mine. I can conscientiously assure you that I still feel as great a devotion as ever to the art I practise, although age is generally supposed to dull enthusiasm, and to give rise to a prosaic and worldly spirit. Happily our art always tends to maintain youthful thought; with all its difficulties it has this great compensation, that to the last we can take a joy in our work, and a pleasure in striving to arrive at that ideal in art so ably described by George Gissing:—

"Art might be defined as an expression, satisfying and abiding, of the zest of life. This is applicable to every form of art devised by man, for in his creative moment, whether he produce a great drama or carve a piece of foliage in wood, the artist is moved and inspired by supreme enjoyment of some aspect of the world about him—an enjoyment in itself keener than that experienced by another man, and intensified and prolonged by the power which comes to him we know not how—of recording in visible or audible form that emotion of rare vitality."

Criticism of Students' Designs.

After the president had delivered his address, Mr. Alfred W. S. Cross read a criticism of the works submitted for the prizes and studentships, 1906-7. He expressed the opinion that the work received this year was, in general, somewhat disappointing, and fell far below the standard of previous years, both in regard to design and drawing. The essays were meritorious.

As regards the Soane, the competitors had paid very little attention to scientific planning. The ideal plan was always apparently of the simplest character, but those submitted were unnecessarily complex. He pleaded for more accurate scholarship in the architecture of the designs. Better training for the student was, of course, needed. But he excepted from such criticism Mr. Jackson's work for the Owen Jones studentship, and Mr. Robertson's measured drawings, which were exceptionally good.

Mr. Horsburgh, the winner of the Essay Medal, came to the conclusion that the use of structural steel in this country was only a passing phase, whereas Mr. Verstage (second) came to exactly the opposite conclusion.

As regards the Measured Drawings Medal, Mr. Cross said Mr. Owen was to be congratulated on his drawing and on the selection of his subject (Magdalen College, Oxford).

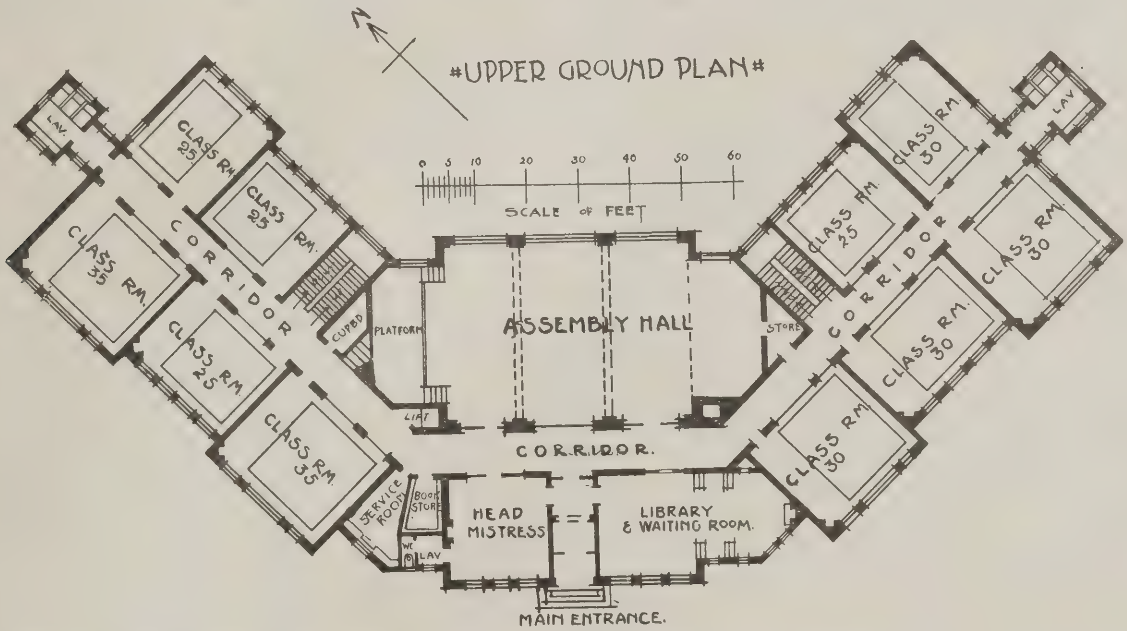
The elevations of Mr. Coopper, the winner of the Soane Medallion, were satisfactory, but his plan had several points for criticism. Mr. Barker's design was good in the elevations, but was weak in some details of the plan. Mr. Pitcher's design was the best of those submitted; the plan being simple and the elevations satisfactory; but the author had been passed over because he ignored one of the salient conditions of the competition.

The drawings of Mr. Jackson, the winner of the Owen Jones Studentship, were of far more than average merit, and he was to be congratulated on his thoroughly good and conscientious work. Mr. Atkinson's drawings were all charming, but bore no particular reference to the purpose of the competition.

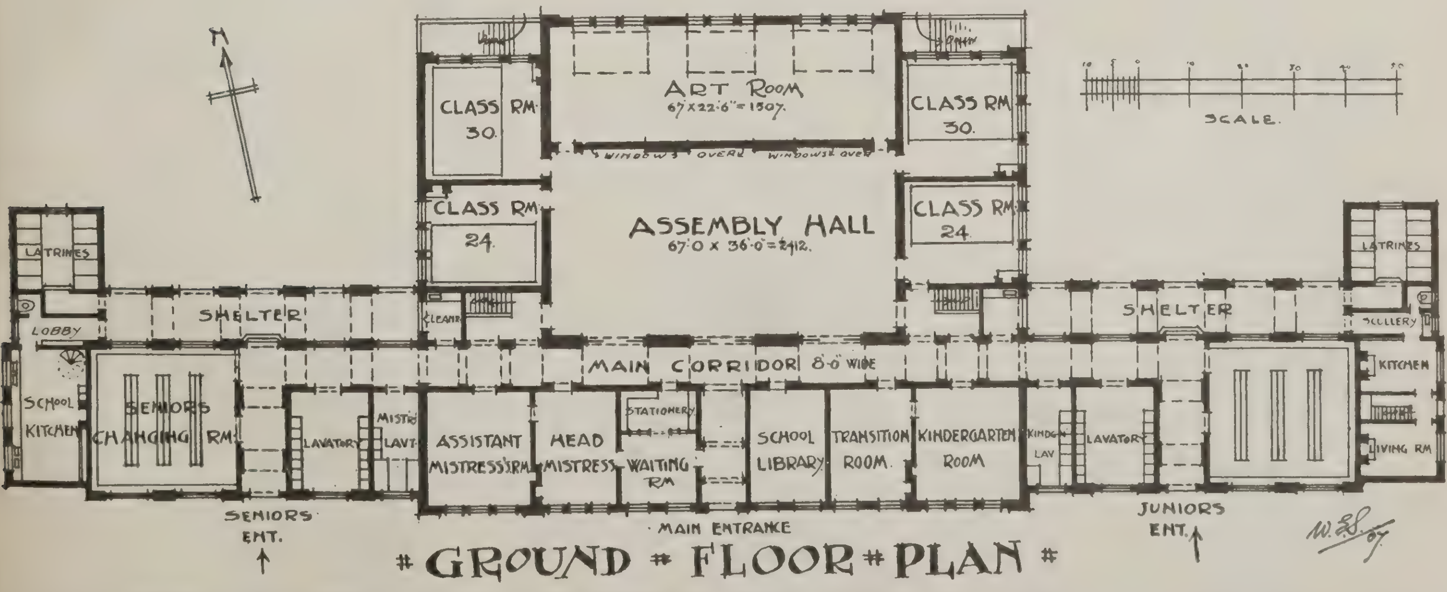
Mr. Nicol, the winner of the Tite Prize, fully deserved his position. His design exhibited good proportion and effective ornament.

For the Grissell Gold Medal Mr. W. A. Mellon submitted a clever design, marred, however, by a semicircular rib placed over the central entrance.

A vote of thanks to Mr. Collcutt and to Mr. Cross was passed on the proposal of Mr. John W. Simpson and seconding of Mr. Munro, past president of the Glasgow Institute of Architects.



BARNSLEY HIGH SCHOOL FOR GIRLS: SECOND-PREMIATED DESIGN. A. E. McKEWAN, A.R.I.B.A., ARCHITECT.



BARNSLEY HIGH SCHOOL FOR GIRLS: THIRD-PREMIATED DESIGN. RUSSELL AND COOPER, FF.R.I.B.A., ARCHITECTS.

[A criticism of the competition for the Barnsley High School for Girls appeared in our issue for last week, when the plans of the first-premiated design by Messrs. Buckland and Farmer and Ashford were given. We are now able to publish the plans of the second- and third-premiated designs.]

NOTES FOR ARCHITECTURAL DRAUGHTSMEN.

By Alfred W. S. Cross, M.A., F.R.I.B.A., and Alan E. Munby, M.A.

PART II.

(Continued from p. 26, No. 623.)

Pendentives.

Fig. III.—The junction of a rectangular and circular figure involves the use of pendentives. The figure shows a hemispherical dome standing upon symmetrically disposed piers and arches. Construct the centre line and set out the section and plan of the dome as described under Fig. 1 (see preceding article).

Draw the cornice at the springing of the dome in elevation (the true section of which will appear at the extremities of the diameter) and the arch, archivolts and imposts in elevation below, keeping the archivolt sufficiently far from the wall to enable it to clear the similar moulding of the arch at right angles, as shown on plan.

Construct a square, circumscribing the circular plan of the dome, which gives the plan at the impost head, and complete the plan of the piers. The method of obtaining the joint lines of the dome, in elevation, by projecting them from the plan has been fully indicated in Fig. 1 (see preceding article), and those of the cornice are similarly obtained by drawing its several members on the plan and projecting up from the points at which these lines cut the radiating joints.

The pendentives (on plan) springing from the four corners of the square, above the impost caps, have radial and circular joints like those of the dome, and they can, therefore, be projected up to the elevation in a similar manner, as shown. The upper terminations of the pendentives, at the base of the cornice of the dome, all meet at their extremities on the centre lines of the arches supporting the dome.

Circular Staircases

Fig. IV.—This figure shows the setting-out of a circular staircase. Having settled the number of steps in one complete revolution, and this must naturally be decided upon in conjunction with their rise and consideration of head room, set out the plan, draw the limiting lines of the containing cylinder in elevation, and mark off the height to be ascended into the required number of equal parts. It should be noted that the drawing above the plan is not a section, but an elevation with half the wall of the enclosing cylinder removed. This forms a more useful and intelligible drawing than a section through the centre of the newel. The positions of the ends of the risers in elevation are found by projecting the wall and newel end of each step up from the plan. The line of the soffit, assuming that the steps are bevelled off at the back as shown, will be a true helix or spiral. In the case of a stone staircase, such as the one figured, the newel is formed by the projecting ends of the steps themselves worked to a circle on plan, while the other end of each step is, of course, tailed into the wall. Since the plan must cut through one of the steps, one of them is shown in section with the full width of this stone at its back edge.

Wreathed Columns.

Fig. V.—There are several methods by which a wreathed column may be set

FIG 3

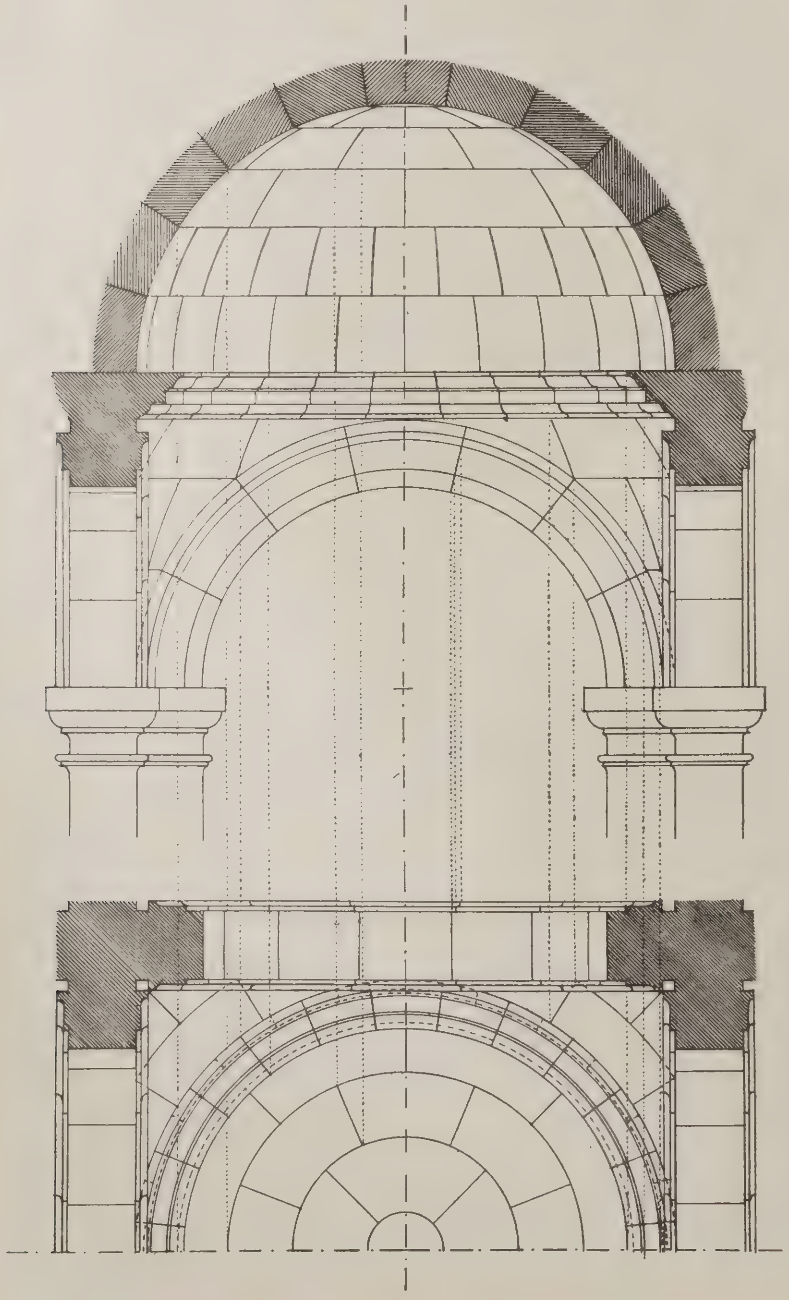
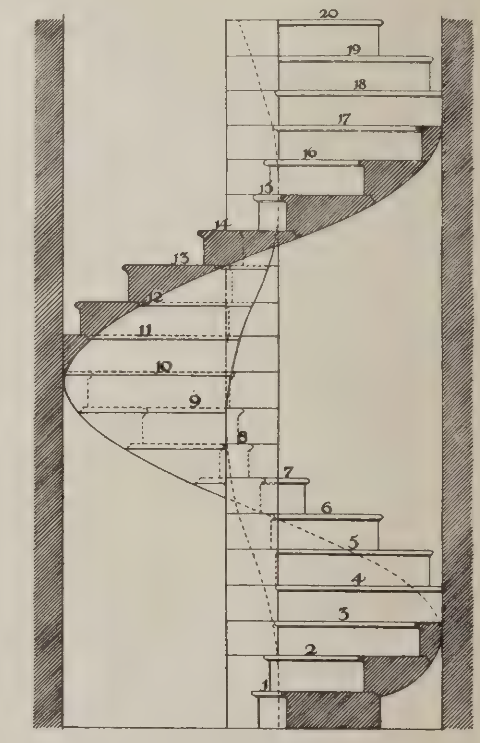
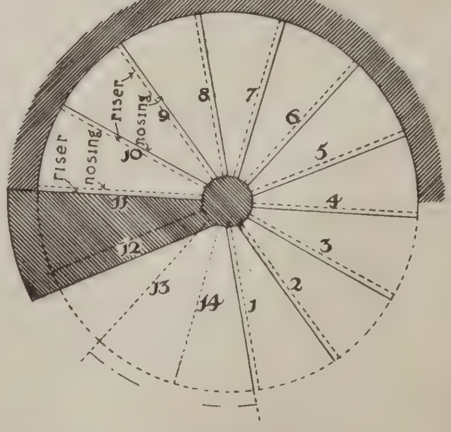


FIG 4

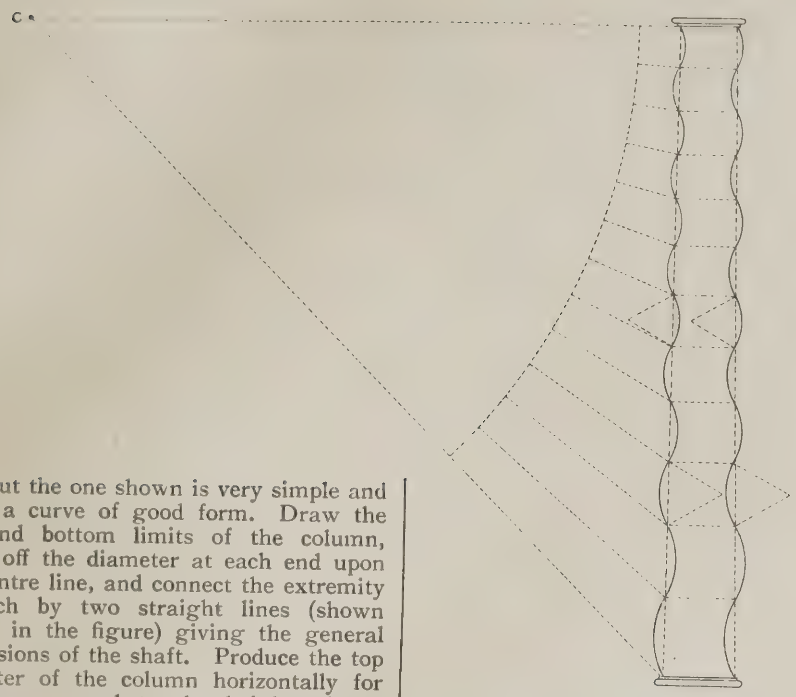


Sectional Elevation



Plan

FIG 5



out, but the one shown is very simple and gives a curve of good form. Draw the top and bottom limits of the column, mark off the diameter at each end upon the centre line, and connect the extremity of each by two straight lines (shown dotted in the figure) giving the general dimensions of the shaft. Produce the top diameter of the column horizontally for a distance equal to the height of the shaft and from the extremity of this line *c*, at any distance slightly removed from the column, strike an arc as shown. Divide this arc into as many equal parts as there are wreaths required on the column, and draw, through the points on the arc thus obtained, radii from *c* to the surface of the column. Continue these lines horizontally across the column, and form, in each alternate space thus obtained, an equilateral triangle, the base of which is the length of the column cut off by the limiting horizontal lines. The apexes of these triangles are the centres from which, with radii equal to the length of one of the triangular sides, the arcs forming the wreathing are struck in alternate spaces. The arcs for the other side of the column are obtained from the same triangles moved to the opposite surface of the column as shown, while the alternate arcs, in the intervening spaces, are found by similar reversed constructional lines.

(*To be continued.*)

THE ACADEMY.

The sending-in day for architectural drawings for this year's Royal Academy exhibition is Thursday, March 28th, from 7 a.m. to 10 p.m.

All works must be under glass, in gilt frames, with the title of the work and the name and address of the author written on the back, and the same information given on a label tied by a string so to hang over the front. A form must also be sent to the secretary giving the titles of all works submitted, and the name and address of the author. (Forms and labels can be obtained *during March only* from the secretary of the Royal Academy, Burlington House, Piccadilly, W., all applications to be accompanied by a stamped addressed envelope.)

Not more than three separate works can be submitted by any one person.

As in former years, we shall be glad to receive any architectural works for exhibition and to deliver them free of charge at the Academy, after having made reproductions of such of them as we desire to publish.

Views and Reviews.

For Building Trade Classes.

From Mr. Francis W. B. Yorke, architect and surveyor, of 38, West Street, Stratford-on-Avon, we have received the first of a series of cards which he is publishing for use in technical and other schools. The cards measure about 16ins. by 11ins., and the one before us describes and illustrates the various tools used by painters and decorators, glaziers, paperhangers and grainers. The special feature is that on each card there is given a whole-plate photograph of the numerous tools, set out and numbered. Collective illustrations of painters' tools have been given in many publications, but this is the first instance of which we know where they are shown so admirably by a photograph. Altogether 58 tools are shown and a short description given of each against the number corresponding to that marked on the photograph. We can recommend these cards as excellent for class use. The price of each is 2s. nett.

"The Local Government Annual."

This is the sixteenth issue of "The Local Government Annual"—a most useful little book giving information which it is difficult to find elsewhere, such as the names and addresses of the chief officials of all corporations, borough, county, urban and rural district councils, boards of guardians, county and borough asylums, &c., &c.; and in addition to the directory there is much information about libraries, baths and washhouses, and electric light undertakings in the boroughs of London, while the abstract of the local government legislation of 1906 cannot fail to be of service.

"The Local Government Annual and Official Directory, 1907," edited by S. Edgecumbe Rogers. London: "The Local Government Journal" office, 27a, Farringdon Street, E.C., price 1s. 6d.

GOTHIC SCULPTURE AS APPLIED BY BURGES.

At the last meeting of the Leeds and Yorkshire Architectural Society Mr. E. Nichols read a paper on "Gothic Sculpture as Applied by the late William Burges, R.A." Mr. Nichols said: "I have great pleasure in coming to Leeds to talk about William Burges, because were I to give this lecture to a London audience they might ask what had he done that they might see: I should tell them to go to Cork or Cardiff, whereas, here in Leeds, Studley Royal Chapel and Skelton Church are within easy reach. The memorial chapel at Studley Royal suffers, I think, from being too near to Fountains Abbey. What is left of the Abbey is so grand and reposeful, while Studley Royal Chapel seems too small for the amount of over-decorated detail. Skelton Church stands alone; there nothing is forgotten, even to the holy well in the churchyard. Burges loved these things—detail, animals, and colour. 'The interior of every old building invariably glowed with richest gold and colour, and every village church was a Ste. Chapelle of a St. Stephen's, Westminster, according to the general run of antiquaries.' Thus he wrote to the Society of Antiquaries in 1861. I have never been able to make up my mind on the subject of painted sculpture. The South Kensington authorities have recently added some carved and painted Gothic spandrels, which are splendid and most effective, but time I feel has much to do with it.

Burges's Lions.

"Mr. Burges gave to the British Museum an ivory dagger handle in the form of a lion's head, now in the Assyrian Gallery. I have a cast of it with me. This small lion's head and the Assyrian winged bulls appear to have inspired him in his treatment of animals. He never perpetrated a Gothic lion; he did many lions, but always of an Assyrian character; for instance, the four evangelistic emblems on a ground of gold mosaic surrounding the great rose window of Cork Cathedral are distinctly Assyrian, or rather Babylonic.

"Cork Cathedral was his *magnum opus*, and it was barely completed when he died 25 years ago. The central doorway, with a figure of the bridegroom between the five wise virgins and the five foolish virgins, is a most original and daring treatment.

"Of all the Gothic revivalists Burges was

the only man who got humour

into his sculpture, and surely there was a strong sense of humour in Gothic. I do not mean the comic or merely grotesque. Take, for instance, the large gargoyles on Cork Cathedral: 'Chastity subduing Lust,' 'Faith piercing the eyes of Idolatry,' 'Pride and Humility,' 'Avarice.' In Burges's own house he had a grammar chimney-piece, where all the parts of speech were carved—noun, verb, adverb, and all the rest. My illustrations are taken from the original models made by my father, the late Thomas Nichols, with the exception of those made from the drawings, &c. I have a few of the architect's original sketches, and you can see in the actual working out by the sculptor how wonderfully the two men worked together in perfect sympathy and accord."

PLYMOUTH LIBRARY AND MUSEUM COMPETITION.

This competition was limited to local architects, 20 designs being submitted. Mr. Henry T. Hare, F.R.I.B.A., was the assessor, and at last week's meeting of the Museum and Art Gallery Committee his award was approved. It appears that at the previous meeting of the Committee Mr. Hare raised the question as to whether one of the competitors among the first four had complied with the conditions of the competition, and he was asked to select another number. Finally it was decided that the competitor in question had committed a breach of the conditions, and he was accordingly disqualified. Mr. Hare's final award was as under:—

1st, Messrs. Thornely and Rooke.
2nd, Mr. J. Leighton Fouracre.
3rd, Mr. John H. Vincent.
4th, Mr. B. Priestly Shires.

The designs were on exhibition last week.

Messrs. Thornely and Rooke's fills in the entire length of available frontage to Tavistock Road, at present vacant.

The Library

has a central entrance, from which access is gained to the borrowers' counter, 65ft. in length. On the right of the entrance hall is the general reading and newspaper room, 57ft. by 42ft., cross-ventilated, in direct communication with the lending library, and well supervised by the porter from his office. On the left of the hall is the lecture-room, 41ft. by 30ft.; also the magazine-room, 39ft. square. The lending library provides accommodation for 26,900 volumes. A wide stone staircase leads to the first floor, where are the local collection room and reference library, respectively 41ft. by 30ft. and 55ft. by 43ft. One attendant can completely supervise both these rooms from a central counter. On this floor also is the librarian's room, 25ft. by 18ft., with strong-room accommodation attached. It will be possible for the librarian to supervise a large amount of the lending library and borrowers' counter downstairs by means of a bay window looking into the space below. The librarian has direct access from his room not only to the reference library, but also to the stack-room (where most of the books for the reference library are stored) and to the working portion of the library. The stack-room gives accommodation for 26,000 volumes, and is in close connection with the catalogue-room, store-room and binding-room, the whole being connected with the ground floor by means of a staff staircase. In the basement are the usual book stores, general stores, packing-room, and heating cellar.

The Museum

has a spacious entrance hall, about 45ft. square, top lighted, with a gallery around. On either side of the entrance are cataloguing- and cloak-rooms. On the ground floor of the building are two galleries, 80ft. by 30ft., and over these are picture galleries of a similar size, top lighted. Provision is also made for future extension by two other galleries on each floor. In the basement is a lecture-hall, accommodating about 300 people; also a laboratory for the curator's use.

As regards the elevation to Tavistock Road, it has been felt desirable by the architects to carry both the museum and library through at one continuous level so as to obtain the architectural composition asked for by the assessor in the instructions to competitors. The acute slope of the street has, however, entailed the library windows being introduced at some different levels to those of the museum. It is at present proposed to face a large portion of the building with local limestone, the dressings and the moulding work generally being in Portland stone.

The total cost of the scheme as submitted by the architects is £25,000—namely, £13,000 for the library and £12,000 for the museum and art gallery.

Commenting on the competition, "The Western Morning News" says that the result justifies their protest against "the narrow-minded action" of confining the competition to local architects. "It is no secret that had the competition been wider in its scope the local architects would not have been successful in securing the first place, and the necessary consequence is that Plymouth, out of a mistaken and retrograde excess of local patriotism, will be saddled with one more public building which, to say the least, is not truly representative of the highest architectural talent of the day. . . ."

Correspondence.

Barnsley High School for Girls Competition.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—My attention has been drawn to a paragraph in the critique under the above heading in your issue for January 30th, in which it is stated that "two of the local architects were in the final running," &c. As a matter of fact, there were three local architects whose plans were among the number specially commended by the assessor—Messrs. Wilby and Dyson, as noted in your columns, and also Messrs. R. and W. Dixon, of Barnsley.—Yours truly,

W. P. DONALD,
Clerk to the Governors.

BARNSLEY.

Notes on Competitions

Secondary School, Bishop Auckland.

From a printed selection of replies to questions in regard to this competition we extract the following:—"The assessor will, independently of the committee, make the award. In consultation with the architect who may receive the premier place in the award, and before final estimates are obtained, the committee may arrange modifications of the plans."

It is left to the discretion of competitors to decide the number of blocks of buildings, the question as to whether one or two storeys shall be provided, and as to whether the buildings shall be in separate blocks or connected. It is suggested that Dunhouse stone shall be used for walling and dressings. Local bricks are not suitable for external facings. There is no suggested cost beyond which competitors are not expected to go. An answer in the affirmative is given to the following question:—"As competitors are often tempted to place a very low estimate upon the cost of the suggested works so as to influence the committee in their favour, won't the committee leave the estimating in the hands of their assessor and prohibit competitors from affixing any price to their scheme, and also check the stated contents of any under final consideration?"

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
Feb.	16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
Feb.	20	CHURCH AT LIVERPOOL.—To cost £7,500. Limited to architects in Lancashire. Particulars from Rev. G. Peters, 71, Hope Street, Liverpool.
Feb.	26	CHURCH HALL, STOCKTON-ON-TEES.—To cost £1,500. Particulars from A. Livingstone, 24, Russell Street, Stockton-on-Tees.
March	1	SMALL HOLDINGS, ROSSALL (Houses actually built).—Prizes of £100, £50, and £25. Applications for plots by this date. Particulars from Secretary, Estate Office, Fleetwood, Lancs. (See p. 66 of this issue.
March	3	SECONDARY SCHOOL AT CASTLBFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25. Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford. Yorks. Deposit 10s. 6d.
March	15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham.
June	1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. (See p. 66 of this issue.)
No date.		TWENTY COTTAGES, BALLINASLOE ASYLUM. (Plans and specifications).—Premium £15. Particulars from J. St. L. Kirwan, resident medical superintendent.

Our Plate

This week we give the second of our series of plates on Fontainebleau. The central pavilion facing the Place d'Armes (entrance to the Court of Henry IV.) is one of the most interesting and distinctively French examples of detail with which Fontainebleau abounds. The combination of high roof and pediment, of brick, stone and plaster, and the peculiar manner in which the rustication of the pilasters is effected, are peculiarly French. The whole composition—an immense semi-vault over a smaller doorway—can hardly be said to be satisfactory and is more like the Moorish treatment of a mosque entrance in idea than anything else, but the treatment of detail is distinctly original and in the main very successful. No nation in Europe has been more completely saturated with the spirit of the Renaissance than France and in no other country have the ever-changing wants of modern life been shown to be so completely met by Renaissance architecture. While Palladio and many of the later architects of the Italian Renaissance were imitating antique examples as nearly as possible, France produced an architecture which was completely characteristic of the genius of the French people.

A. W. S. C.
H. W. W.

Obituary

Mr. John W. Simpson, builder, of North Shields, died on January 28th.

Mr. W. A. Waddington.—The death is announced of Mr. W. A. Waddington, the head of Messrs. W. A. Waddington and Sons, architects, of Manchester.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

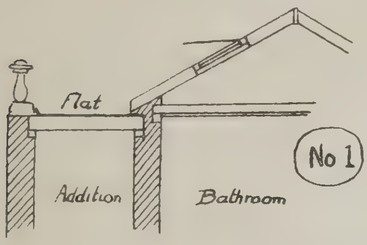
The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

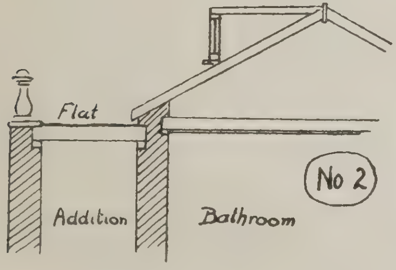
The querist's name and address must always be given, not necessarily for publication.

Correspondents are particularly requested to be as brief as possible.

Skylights.

CAMBRIDGE.—J. W. P. writes: "I have prepared plans for a small addition to a residence here which comes under the jurisdiction of the surveyor to the Urban District Council of Chesterton. In the plan I have shown a skylight in roof which is to give light and ventilation to the bathroom. The by-laws say that a window shall be provided to each room of at least one-tenth of the floor area of such room. Nothing is mentioned with regard to skylights. The surveyor has called my attention to this skylight and says he cannot allow it to be put in and so is compelling my client to provide a dormer window. I should like your view as to whether he is right or wrong, or even has the power legally to act as he is doing. I myself certainly consider a skylight in this case perfectly suitable, inasmuch as it will act not only as a means of lighting and efficiently ventilating the room but will extract the steam from bath more readily than an ordinary window would do. Sketch No. 1 shows what has been deposited, and sketch No. 2 shows what the surveyor has demanded."

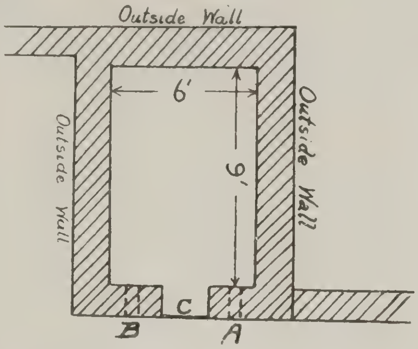




Your by-laws are evidently those most usually adopted in the country, and there is nothing whatever in them to prevent a skylight being used in such a position as you sketch. You may, however, be interested to compare section 70 of "The London Building Act, 1894," with your local by-laws, as there it is enacted that a room having no external wall "may be lighted through the roof by a dormer window"—nothing is said about a skylight, though a lantern light is subsequently mentioned. I think it quite likely that your contention is correct, but I doubt the advisability of contesting the point with the sanitary authority. I do not like skylights—they almost invariably leak. F. S. I.

Dampness in an underground Strong-Room.

ALTON.—C. H. D. writes: "Which is the best way to get a strong-room dry? Referring to the accompanying sketch, at A there is a ventilator (9 × 6) six inches below the ceiling, and another ventilator 6ins. above the floor; at B a ventilator 6ins. below the ceiling. C is the steel fireproof door. Walls, ceiling and floor are covered with $\frac{3}{4}$in. cement, trowelled to a smooth surface. The room is in a cellar, all below ground level. My client does not want any more ventilators if it is possible to do without them, as he is afraid this will not make the strong-room absolutely fireproof."



You do not state whether the condition which you desire to get rid of is the result of (a) new work not yet dried out; (b) dampness from exterior walls abutting against ground; (c) condensation. In case (a) a coke fire burning for a few days with the door open will expedite the drying process. (b) If dampness arises from the omission of vertical damp-course, or dry area against abutting earth, it is practically incurable without the provision of one or other such preventive. (c) If, however, the trouble is, as I suspect, the common one of moisture condensing on the walls, ceiling and floor (which will always occur in confined situations where the materials are impervious), the effective remedy is to remove the trowelled rendering of cement, and to render and float with ordinary lime plaster and finish with a wood float. This gives a slightly absorbent surface capable of taking up the moisture which is bound to condense at each sudden change in the temperature of the air if the ventilation is faulty. The system of ventilation shown on the sketch is poor; ventilators should not be all on one wall. No apprehension need be felt as to the possibility of fire finding its way in through these if a proper type be used. Messrs. Hobbs, Hart & Co., 76, Cheapside, E.C., make a fireproof ventilator for strong-rooms on the principle of the Davy safety lamp. G.

Architect's Fee for examining Building Accounts.

LONDON.—H. writes: "What is the fair charge for an architect to make to his clients for 'passing and examining building accounts'? The architect executed building work under an annual retaining fee which ceased at a certain date, the accounts being dealt with afterwards."

For "measuring up" works the usual fee is $2\frac{1}{2}$ per cent. for small works to $1\frac{1}{2}$ per cent. for large works. If for *merely* settling accounts, a fixed fee of a character governed by the amount of work done and the time involved appears to me to be the more fitting method of remuneration. X.

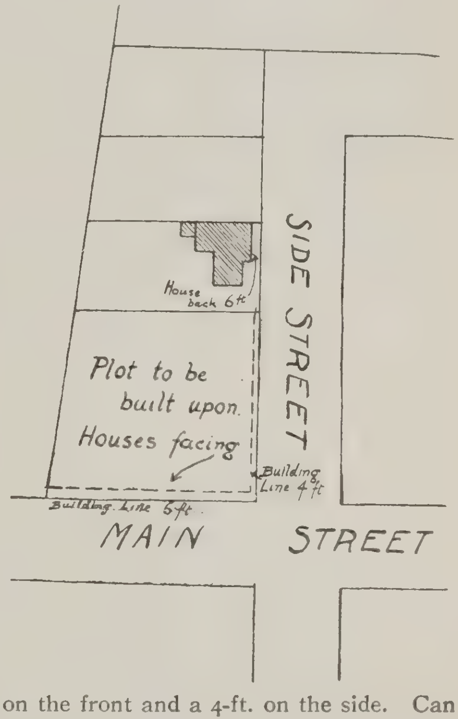
Decorated Vaulting in London.

LONDON.—BEESWARK writes:—"Where can I find in London some Gothic vaulting about the Decorated period, easily accessible to measure?"

Decorated vaulting may be seen in London in the cloisters at Westminster, measured drawings of which have been published several times. ("A. A. Sketch-book," 3rd Series, Vol. 8; "Architecture," Vol. 1.) The west and south walls are about 1350. Probably the most readily accessible example for measurement, however, would be the beautiful little vaulted gateway opening on the east side of Dean's Yard, Westminster, and formerly part of the Abbey buildings. This could be measured without the use of scaffolding or trestles, but permission would, of course, be necessary. G.

Building Line on new Estate.

LONG EATON.—S. H. writes: "A new estate was opened for building, and the conditions were for 6-ft. building lines in front streets and 4-ft. in side streets. I bought a plot at the corner of front and side streets. The owner of the adjoining plot on the side street built his house 6ft. back. The Council now refuse to pass my plans, which show a 6-ft. building line on the front and a 4-ft. on the side. Can they legally do so? It is important that I should use the whole of my land up to the 4-ft. building line. If the Council cannot stop me from building, what steps should I take?"



The Urban Council are within their powers in refusing to allow your new building to project further than your neighbour's. The building line prescribed when the estate was developed has, of course, nothing to do with the local authority. Section 3 of the Public Health Act, 1888, runs:—"It shall not be lawful in any urban district, without the written consent of the urban authority, to erect or bring forward any house or building in any street or any part of such house or building on either side thereof in the same street, nor to build any addition to any house or building, beyond the front main wall of the house or building on either side of the same." The penalty is one of not exceeding forty shillings per day after notice is given. F. S. I.

Book on Perspective.

CARDIFF.—W. H. F. writes: "Is there any book on water-colour perspective giving coloured illustrations of buildings in brick and stone?"

There are, of course, many books on architectural perspective, but not one giving exactly what you desire. The best for your purpose is perhaps "Architectural Drawing," by Mr. R. Phenè Spiers, price 10s. 6d. You might also refer to the "Studio" and "Academy Architecture," in both of which coloured architectural designs are given.

Pitch of Rivets in Girder.

MANCHESTER.—J. C. writes: "Referring to my former enquiry, the case I submitted was the theoretical pitch of a compound girder of 20ft. span, composed of two $20 \times 7\frac{1}{2}$ rolled steel joists and six $18 \times \frac{1}{2}$ plates (not $14 \times \frac{1}{2}$ as stated). The safe load on this girder would be about 200 tons distributed, giving a reaction at the abutment of 100 tons, equal to a horizontal shear of 60 tons per ft. run. Worked on the lines of the example quoted, assuming the rivets in single shear, we should get a rivet pitch of 2ins., using rivets of $1\frac{1}{8}$in. diameter, which is quite an absurd result. Most of the engineering books seem to ignore altogether the question of riveting in flanges, and although the girder submitted is quite an ordinary one met with every day, no formula that I am acquainted with will give me the pitch of rivets required. I shall be glad to know whether the author of the book referred to can further explain the matter."

A reaction of 100 tons at the abutment would give a vertical shear of that amount to be resisted by two webs each, say, 18ins. by 0·6in., or a total area of $18 \times 0{\cdot}6 \times 2 =$ 21·6 sq. ins., or $\frac{100}{21{\cdot}6} = 4{\cdot}6$ tons per sq. in. shear stress, which may possibly be allowed without stiffeners. Also $\frac{100 \text{ tons}}{1{\cdot}5\text{ft. depth}} =$ 66·7 tons per ft. run horizontal shear. Assuming rivets $1\frac{1}{8}$ins. diameter = say 1 sq. in. area each, and $4\frac{1}{2}$ tons per sq. in. safe shear stress, then $\frac{66{\cdot}7}{4{\cdot}5} = 14{\cdot}82$ rivets per ft. run if the whole shear is assumed to occur between the joists and plates.

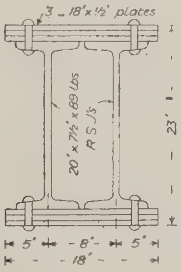


Fig 1

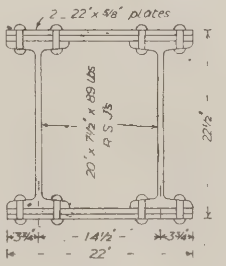


Fig 2

Four rows of rivets will therefore be necessary of, say, 3-in. pitch: hence the proposed section Fig. 1 is unsuitable. It should be widened sufficiently for a rivet boy to get through between the webs to insert and hold up the rivets in the inside flanges, as Fig. 2.

HENRY ADAMS.

Surveyors' Reports.

OMEGA writes: "Is there any recognised form in which a surveyor should make his report on the value of land to be acquired under Act of Parliament, having been asked to value by a solicitor who is acting for party served with notice to treat?"

There are no stated forms for such a report. You should enter fully into the circumstances, detailing the area, character and value of the property, and its value *at the time of the notice to treat*. The solicitor to whom you make your report will then formulate the claim to the compelling party, who will then make an offer. I recommend to you the perusal of some text-book on "compulsory taking." The little book by Mr. Banister Fletcher, published by Spon, is as simple as any with which I am acquainted.

F. S. I.

Liability of Decorators.

LONDON.—W. B. writes: "A firm of decorators removed and refixed a large mirror when decorating a room. Twenty months after the mirror (or overmantel) fell down and was smashed, besides doing other damage. Could the decorators be held responsible for the damage?"

Presumably the decorators had long finished their work, and this had been accepted and no doubt fully paid for when the accident occurred. It is, therefore, not possible that they can be held liable under the contract itself, whether performed under the supervision of an architect or not. In any case, the onus of proving that the fixing of the mirror was negligently or improperly performed would fall upon the owner, and, in my opinion, it would be impossible for him to prove negligence so long after the work was completed.

X.

Trouble with Ovens in Small Villas.

SURBITON.—E. S. writes: "I have recently erected two small villas and have put in the kitchens two portable ranges, one oven and boiler. The chimneys have had 6-ft. tallboys put on them. I have altered one range, which makes no difference. The water gets hot but we cannot get the heat round the ovens. The chimneys have *no draught*. The flues are straight—without a break. Kindly suggest a remedy."

It is extremely unlikely that at a distance one can correctly diagnose such a case, but I would suggest (1) that the chimney may be improperly constructed—too straight, too wide in the breast, in the shade of trees causing downdraught, &c., &c.; (2) that the withes are not properly dividing this from another flue, or even that brick rubbish has been left in the flue at an angle; (3) that a right-handed range has been fixed where a left-handed one should go, or *vice versa*. The oven should be on the side on which the flue goes up, in order that the draught may be towards it. I presume that the ranges are perfect and unbroken.

X.

Up-to-Date Secondary Schools.

LONDON.—ALEC writes: "Please name an up-to-date secondary school (preferably with detached science block) in or within a short distance of London. I am anxious to see the latest cooking arrangements and fittings."

A reference to the latest edition of Mr. Felix Clay's "Modern School Buildings" will provide you with the names of several up-to-date secondary day schools. Perhaps the Clapham and Streatham Schools, belonging to the Girls' Public Day School Company (Mr. J. Osborne Smith, architect), or Aske's School for Boys, at West Hampstead (Messrs. Stock, Page and Stock, architects), would be suitable for your purpose.

E. G.

Building Trade Vacancies.

PLUS ULTRA writes: "Where are vacancies in the building trade advertised? I refer to the positions of clerks of works, building inspectors, instructors in building construction and allied subjects, &c., or any similar position open to a person possessing trade and good practical knowledge of building construction."

Vacancies such as you name are advertised in our own columns and in our contemporaries—the other weekly building papers; also the "Surveyor," "Master-Builders' Associations Journal" (184, Leadenhall Street, E.C.).

Buildings to Measure at Scarborough.

SCARBOROUGH. — THE OLD CASTLE writes: "I am working in Scarborough and would like to measure some buildings of architectural note in this district. Kindly mention some."

A reply to an enquiry about buildings to measure near Scarborough was given on p. 57 of our issue for August 1st last. St. Mary's Church would probably be the most suitable building for you to study.

Book on Cotton Mills.

HALIFAX.—REINCRETE writes: "Is there any up-to-date book on cotton factory building, with types of Lancashire mills?"

"Recent Cotton Mill Construction," by J. Nasmith, price 4s. 6d. nett from Mr. John Heywood, Deansgate and Ridgefield, Manchester.

Library Indicators.

SIDMOUTH.—DOWN SOUTH writes: "In indicators for the lending departments of free libraries I believe there are series of small trays, numbered both sides alike and either end painted a different colour, to admit a small card for the name of borrower, &c. What are the sizes of these trays and divisions?"

Indicators for libraries vary in size, but the trays you mention are usually about $2\frac{1}{2}$ins. deep and about 1in. wide, each end being turned up, one finished in red and the other in black, with a number and letter on each, corresponding to the particular book. The easiest thing for you to do would be to go to a library and see the indicator; any other particulars as to cost, &c., you could get from one of the library furnishing firms, whose advertisements are widely published.

Scantlings for Queen-Post Trusses.

NORTHANTS.—CYMRO writes: "Will the scantlings given below be sufficient for two queen-post roofs of 38ft. and 42ft. spans, the trusses being 10ft. apart?—

Span.	Tie-beam.	Queen post.	Prin. Rafter.	Str. Beam.	Struts.	Purlins.
38ft.	10×6	5×4½	6×6	7½×6	4½×2½	8×5
42ft.	12×6	6×4½	6×6	8×6	4½×2¾	9×4½

Common rafters 4×2 for both spans."

The scantlings suggested will be suitable, but it is an advantage to have the trusses of uniform thickness throughout all the members; in that case a queen-post roof of 38ft. span would have a thickness of $5\frac{1}{2}$ins., and a 42ft. span a thickness of 6ins. The whole of the scantlings would then be:—

Span.	Tie-beam.	Queen post.	Prin. Rftr.	Str. Beam.	Struts.	Pur-lins.	Com. Rftrs.
38ft.	11×5½	4½×5½	5½×5½	7½+5½	2½×5½	8×4½	4×2
42tf,	11×6	5×6	6×6	8×6	2½×6	9×4½	4½×2

HENRY ADAMS.

THE SCULPTOR AND THE GARDEN.*

By Walter Gilbert.

In a paper I was recently invited to read before the Royal Institute of British Architects I dealt with the imagination which must always underlie the efforts of the sculptor, whether they be great or small. I now propose to speak to you of Nature's influence over the sculptor, and I will endeavour to take you through the gardens of the past with all reverence to the architects of bygone years.

The historic material of the garden itself is too vast for me to do other than briefly survey. I have only to recall to your mind the Garden of Eden. I do not propose to state that there was a sculptor there, nor have I proof to put before you that he existed in the Garden of the Hesperides. It is easy, however, to imagine that in the suspended gardens of Babylon, the paradises of the Persian kings, the sculptor had a happy time, for the Assyrians—a race of sculptors—have left their handwriting on the Palace of Assur-Bani-Pal.

The Gardens of Judea were certainly of little account, but the poets of Egypt gloried in their parterres.

Greek gardening, though very far from reaching the level of its sister arts, attained through the sculptor's aid and expression a dignity which influenced the stateliness of gardens ever afterwards, firing the imagination of sculptors and architects alike. The beautiful sacred gardens, public and private, around the Greek temples, the thickets, groves and parterres dedicated to the divinity of the place, have never been surpassed, and the picture held out to us by the old Greek writer of Alcamenes' figure of Aphrodite set up in her park of the Ilissos must have clothed the imagination of all who passed this rare shrine. Again, there is Pindar's glowing description of the public garden of the Eternal Dead which Athens created in her territory some 500 B.C., enriched with fountains and altars to the Muses, and in sight of the Acropolis and the Parthenon.

The Romans primarily had no love for the garden, but their victories in the East, drawing to their city the fabulous riches of Asiatic monarchs, led to notable changes, so that the fruitful ground of Italy became covered with magnificent parks and gardens characteristic of the Greco-Roman period. Were there not the parks and walks which Pompey, Cæsar, Augustus, Agrippa and Nero offered to the public? We read at Pompeii of fountains, of running water emptying itself from lions' heads, of gay little statues of children, fauns or birds in the garden of the interior courts, and of little bronze figures in the colonnades. These gardens of the atrium were, indeed, as Juvenal says, as carefully planned as any part of the house: the very limit of the space, shut in between four walls, necessitated the most careful attempt to obtain the best effect, and they were wonders in miniature, these little gardens, gorgeous with palms and orange trees, with roses and oleanders, with peacocks strutting on the stone-paved walks, and nymphs making merry in the shade.

As in the French gardens of the seventeenth century, the sculptor's heart was rejoiced, for paintings of Pompeii show us statues everywhere—here a balustrade, a vase, a bas-relief, there a Mercury, a laughing satyr, Jupiter, Juno, Venus or Diana—quite a Pantheon of mythology ordered with jealous care.

The increase of commerce and the growth of the commercial element led the luxurious to quit the town and build villas with spacious gardens in the suburbs, and "it is thus that Italy from the gulf of Baia to the foot of the Alps is studded with elegant villas."

The conquest of the Romans extended their love of the garden in the West, but the removal of the court to Byzantium caused the decline and neglect in the beauty of the gardens of the Romans themselves. With the gradual growth of the Christian religion we find the almost sudden decay of the art of the sculptor so far as the garden itself is concerned. During this time the gardener developed his knowledge of fruits and plants, enriched his gardens by the arrangement of natural forms, by well-clipped hedges, and by simple walks, but his fountains became fishponds and his gardens became boudoirs for women's industry and retirement. At length, however, the Italian woke up to the beauties of the antique, and we can picture Dante, Petrarch and Boccaccio searching the old manuscripts, inclining their intelligences to distant civilisations. Brunelleschi restores Roman architecture, Donatello, Bramante, Cellini, inspire themselves with Greek and Roman art. And now, as in Roman times, the architect designed gravel walks encircling the house, built porticoes to court the sun and welcome shadow, and sought everywhere in laying out his gardens Nature's sweetest aspect. Again Ceres looked out over her ripening fruit, again Flora watched her many-coloured mantle spreading around the walks, again Jupiter in sombre silence looked across the town.

Under the influence of the great seigneurs the garden of the Italian villa becomes, in fact, the Roman garden, intelligently adapted to the fresh conditions of life.

But leaving Italy, and following in the wake of many Italians, at this period we feel the Renaissance of France under the Medici influence, and, later, that of Louis XIII. and Louis XIV. Le Vau, Le Notre and Franciin—an ideal trio of collaborateurs—were now thinking out the garden of Vaux le Vicomte, the château and gardens of Fouquet, which provoked Louis XIV. to rival and surpass his minister's achievement in the gardens of Versailles. No fewer than 18,000 people were at one time employed on building this château and making these gardens.

Probably it occurs to some that there is a distinct difference in these French gardens to those of the Italian. Personally I think it is that in the Italian garden Nature is taken as she is and Art is added, whereas in the French gardens Art is the first consideration, and Nature made the servant. In the former the country did not change its aspect, but was embellished by the sculptor's hand; in the latter the sculptor and architect were paramount and the woods were arranged for sculptors' groups and parterres prepared to give value and the background to the sculptors' fountains.

But in spite of this (to some) fundamental fault, the gardens of Louis XIV. are a wonderful creation in that although they imitated those of the Italian yet they remained thoroughly French, being a triumph of those French qualities of elegance and clairté of which no Italian ever dreamt.

In no case in England do I know of any such imagination as the sculptors have shown at Versailles, unless it be these delightful amourettes at Melbourne—the handsomest conception of their kind in this country.

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* Extracts from a paper read before the Edinburgh Architectural Association on January 16th.

THE NEGLECT OF ARCHITECTURE.

Although the beginning of the twentieth century shows signs of even greater activity in building than the nineteenth, the neglect and ignorance of architecture by the Press and in contemporary literature is remarkable. The magazines and newspapers teem with articles on modern music, modern painting, and modern applied art, and, compared with all this, the attention given to architecture is so small as to be practically negligible. It may be said that architecture is not the loser, but at any rate painters and musicians are kept in contact with the general feeling of the time. Architects certainly know that the clergy want Gothic churches, and fourteenth-century Gothic if they can get it, and in that very personal form of architecture, the building of small houses, architects can arrive at the feelings and ideas of their clients; here English architecture has made its greatest progress in recent years. But the architecture of great buildings is a social not a personal art, and it would be interesting to learn what part, if any, architecture as an art plays in our modern complex civilisation. What does the cultivated Englishman really know and care about modern architecture? Does it mean anything to him? Music, for example, certainly does. There exists in London, and still more in the manufacturing centres, a large public that will crowd to hear the difficult ultra-modern music of Strauss and Elgar, also many others who prefer the compositions of more academic composers. Is there any architectural public at all in this sense, at any rate any public that can make such discriminations in the technicalities and niceties of architectural style? At the period of the Gothic Revival some such interest in Gothic architecture was fairly general, and this still continues in an antiquarian manner among the clergy and in local societies. But for the modern classic architecture of our towns is there any such feeling of like or dislike? Does anyone get angry with entasis on a pilaster? I imagine that if an ænta had appeared with entasis in Athens B.C. 433, ostracism at least would have been the fate of the architect. But now does anyone mind whether a public building is built according to the strict canon of Palladio or with the greater freedom of Wren, much less appreciate those subtle nuances that go to perfect a fine art? Well, it might be interesting to know, and one method would be to ask representative men of other professions to say candidly what they think about modern architecture. We have had Mr. Hardy's and Mr. Wells's very clear remarks on the shortcomings of restorers and house architects, but if these gentlemen would only carry their enquiries a little further into the real essentials of our art, architects might receive some valuable if painful enlightenment.

A. T. G.

ANOTHER COTTAGE EXHIBITION AT LETCHWORTH.

At Letchworth (Garden City) an exhibition of urban cottages and homesteads for small holdings is to be held from June 1st to September 30th next.

Urban Cottages.

In the section devoted to urban cottages prizes (not yet announced) will be given in the following four classes:—

Class 1.—Two bedrooms, living-room and scullery; a third bedroom and parlour may be added. Total cost not to exceed £175.

Class 2.—Three bedrooms, parlour, kitchen, with sink, and outside wash-house with copper. Total cost not to exceed £200.

Class 3.—Three bedrooms, parlour, kitchen and scullery. Total cost not to exceed £240.

Class 4.—Best artisan's cottage, not limited as to cost.

All cottages are to contain a larder, with outside window, w.c., and bath, and to have gas and water fittings ready for connection, and drainage to main sewer provided. Height of rooms to be not less than 7ft. 6ins. Cottages to be semi-detached, or in groups of four and six, but varying classes may compose the groups.

Where the exhibitor is desirous of building a single cottage of a type suitable to be built in rows, the Garden City Co. will endeavour to combine such with other single cottages into groups, and will in this way be able to admit them into the exhibition, subject to modifications to this end being made.

Small Holdings.

In this section prizes will be offered as follows:—

Class 5.—Cottage with simple outbuildings, suitable for small holdings of 5 acres. Cost not to exceed £200.

Class 6.—Cottage with barn, stable, cartshed and pigstye, suitable for a small holding of 20 acres of arable land. Cost not to exceed £250.

Class 7.— Small holder's house (to contain dairy), with pigstye, shed and cowhouse, for two cows. Cost not to exceed £300.

All cottages in this section are to comply with rural building by-laws, and to contain three bedrooms, water fittings, larder, and outside earth closet.

Prizes are also offered for the best inventions or improvements in building materials and fittings calculated to cheapen or facilitate the erection and upkeep of cottage property, while other prizes are offered for the accessories of small holdings.

There will also be an exhibition of cottage furniture, &c.

With regard to cost of erection, effectual means will be taken to provide that all buildings entered for competition are entered at the price for which they can actually be erected. Not only will detailed specifications in every case be required, but all competitors will have to undertake, either to sell their cottages to the Garden City Co., if called upon to do so, at the price quoted in the catalogue, or to erect on the estate other cottages exactly similar at the same price. On the other hand, when the cottages are not taken over, a rent amounting to 6 per cent. on the stated cost in the urban section and 5 per cent. in the small holdings section will be guaranteed to the exhibitor for a period of five years.

Full particulars can be obtained from Mr. W. V. Cooper, hon. secretary, Exhibition Committee, 326a, High Holborn, W.C.

SMALL HOLDINGS EXHIBITION, ROSSALL.

The directors of the Fleetwood Estate, being so satisfied with the cottage exhibition held by them at Cleveleys last year, have decided to hold a homestead exhibition this year at Rossall, close by; the scheme being designed to show the commercial success of the small holdings system when applied to land at a reasonable price. The exhibition site at Rossall is about half a mile from the sea-shore, with good communication by tram, rail and road, Fleetwood being only two miles away, and Blackpool five.

The Prizes Offered

for the best exhibits are as follows:—First prize, £100; second prize, £50; third prize, £25; these prizes to be adjudicated by "independent judges of recognised standing," and the awards announced during the summer of 1908.

In addition to the above-mentioned prizes for houses actually built, two prizes are offered for plans and specification of homestead, outbuildings, and scheme of laying out a 3-acre plot to the best advantage; the cottage to contain not fewer than three bedrooms, and to be built in conformity with the by-laws of the Fleetwood Urban District Council. The prizes in this section are:—First prize, £10; second prize, £5. The last day for sending in designs is June 1st next. Further particulars can be obtained on application to Mr. D. Abercrombie, 25, Cross Street, Manchester; Mr. T. G. Lumb, 26, Birley Street, Blackpool; Messrs. Sale & Co., 29, Booth Street, Manchester; or the Secretary, Estate Office, Fleetwood.

Exhibition plots will be leased for 99 years, with a right to purchase the freehold at any time within seven years. The rent will be £4 per annum per acre, though no rent will be payable for 1907, and for 1908 there will be a reduced rent of £2 per acre. Applications for plots must be made before March 1st next. Homesteads are to be substantially completed and land under cultivation before August 1st, and the total cost of homestead and outbuildings must be declared before January 1st, 1908.

New London Buildings

At yesterday's meeting of the London County Council the Music Hall and Theatres Committee and the Building Act Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics*:

Drawings submitted by J. Emblin-Walker for the structural improvement of the Palace Theatre of Varieties, Shaftesbury Avenue. (*Consent.*)

Drawings submitted by Blow & Billerey of the Playhouse, Northumberland Avenue, showing deviations and also a proposed modification of the arrangement of the front balustrade of the pit circle at the premises. (*Consent.*)

Drawings, submitted by G. W. Keats, on behalf of the Council of the Metropolitan Borough of Woolwich, showing the electric lighting arrangements for the public portion of the Plumstead Baths, Woolwich. (*Consent.*)

Drawings submitted by W. F. Hurndall of a building to be used as an academy of dancing and to be erected at the junction of Uxbridge Road and Arminger Road, Shepherd's Bush. (*Consent.*)

Drawing submitted by E. J. Stubbs showing a proposal to instal revolving doors in the screen between the exhibition hall and entrance hall at the Royal Horticultural Hall, Vincent Square. (*Consent.*)

Uniting of No. 56 with No. 58, Moorgate Street, and a building on the southern side of Cross Key Court, City, without requiring the floors of Nos. 56 and 58, Moorgate Street to be made fire-resisting, on the application of W. T. Walker, on behalf of G. J. Mathieson. (*Consent.*)

Four houses on the northern side of Hannington Road, Fulham, with flanks abutting upon Napier Avenue, Ranelagh Avenue and Cromwell Avenue, on the application of A. Dawkins, on behalf of R. B. Mason. Extension of period. (*Consent.*)

Additions to "The Old Mansion," Frognal, Hampstead, on the application of E. Owers, on behalf of E. P. Musmann. (*Consent.*)

Retention of a motor-car shed at the rear of No. 156, Haverstock Hill, Hampstead, abutting upon Lawn Road, on the application of Dr. H. Sanders. (*Consent.*)

Retention of a porch in front of No. 61, Holland Park Avenue, Kensington, on the application of G. J. Clark, on behalf of Eugen Sandow. (*Consent.*)

Projecting one-storey shop in front of No. 149, High Street, Lewisham, on the application of L. Jacob. Extension of period. (*Consent.*)

Additions and raised basements in front of Nos. 1 and 2, Albert Villas, Station Approach, Catford Bridge, on the application of A. W. Osborn, on behalf of D. Murray. (*Consent.*)

Block of shops with a concert hall over upon the site of St. Paul's Church, Great Portland Street, St. Marylebone, on the application of Joseph & Smithem, on behalf of Perry Brothers. (*Consent.*)

Garage and office building at the southern end of Carrington Street, Mayfair, on the application of Pilditch & Co., on behalf of the Electromobile Co., Ltd. (*Consent.*)

One-storey shops on part of the forecourts of Nos. 291 to 301 (odd numbers only), inclusive, Cavendish Road, Balham, on the application of D. Watney & Sons, for an extension of the periods. (*Consent.*)

Twelve houses with projecting bay windows on the northern side of Wavertree Road, Streatham Hill, on the application of Chapple and Utting. (*Consent.*)

Retention of an addition at the rear of Nos. 158 and 160, Balham High Road, Wandsworth, abutting upon Ramsden Road, on the application of T. J. Evans, on behalf of J. & W. Daniel. (*Consent.*)

Buildings on the southern side of Melrose Road, Southfields, to abut also upon the eastern side of Avenue Road, on the application of A. W. Taylor, & Co., on behalf of A. Duff. (*Consent.*)

Porch and a one-storey shop in front of No. 117, Victoria street, Westminster, with the one-storey shop to also abut upon the western side of Francis Street, on the application of R. G. Hammond, on behalf of the Reformatory and Refuge Union, Incorporated. (*Consent.*)

Building on the western side of Aston Street, Stepney, to abut on the southern side of Elsa Street, on the application of H. Watts-Johnson. (*Consent.*)

Factory and warehouse building on the northern side of Leeke Street, King's Cross Road, St. Pancras, eastward of the Metropolitan Railway cutting, on the application of M. Garbutt, on behalf of the Metropolitan Railway Surplus Lands Committee. Extension of period. (*Consent.*)

Retention of a boundary fence at less than the prescribed distance from the centre of Russell's footpath, Deepdene Road, Streatham, on the application of J. W. Coates, on behalf of the Streatham Estates Company, Ltd. (*Consent.*)

Building, with a projecting crane in front, on the south-eastern side of Grimscott Street, Bermondsey, on the application of R. C. Fry, on behalf of the Anglo-American Cleaning and Decorating Company. (*Refusal.*)

One-storey shops in front of Nos. 404 and 406, Coldharbour Lane, Brixton, on the application of Style & Winch, Ltd. (*Refusal.*)

Retention of a wood and zinc structure over the porch in front of "The Woodlands," Burgess Hill, Hampstead, on the application of J. W. Hunter, on behalf of Mr. Viola. (*Consent.*)

Retention of a rustic summer-house in the garden forming the forecourt of No. 61, Holland Park Avenue, Kensington, and also trellis-work around such garden, on the application of G. J. Clarke, on behalf of Eugen Sandow. (*Consent.*)

Retention of a wood and iron structure for storing petrol in front of No. 49, Bathurst Mews, Paddington, on the application of Hoare & Wheeler. (*Consent.*)

Additional block to abut upon Scrutton Street and Clifton Street, at the factory of Messrs. Waterlow & Sons, Ltd., Paul Street, Finsbury, on the application of H. C. Smart, on behalf of Waterlow & Sons, Ltd. (*Consent.*)

Workshop building at the rear of No. 69, Pattison Road, Woolwich, with a boundary fence at less than the prescribed distance from the centre of a passageway leading from Pattison Road to Hudson Road, on the application of H. Greenberg. (*Consent.*)

Addition to Nos. 95 and 97, High Street, Kensington, so far as relates to the erection of a water-closet and lavatory building on the roof of such addition. (*Consent.*)

Alterations at the factory of Venesta, Ltd., No. 242, West Ferry Road, Millwall, on the application of J. J. Robson, on behalf of Venesta, Ltd. (*Consent.*)

Notes and News

Mr. H. Chatfield Clarke, F.R.I.B.A., has been appointed a Land Tax Commissioner for the City of London.

A Tunnel under the Elbe at Hamburg, for foot passengers and vehicles, is to be constructed by the municipality at a cost of more than £500,000. Lifts will be provided at each end.

The new Baths at Handsworth, Birmingham were opened last week. They have cost about £23,000, and are situated in Grove Lane, at the corner of Hinstock Road. There are two swimming baths, with Turkish bath, slipper baths, &c. Mr. J. P. Osborne was the architect.

St. Paul's Cross is to be restored in front of St. Paul's Cathedral, the Courts having decided that the late Mr. Richards' legacy of £6,000 may be so applied. The original "Paul's Cross" was a pulpit cross of timber, mounted upon steps of stone, and covered with a conical roof.

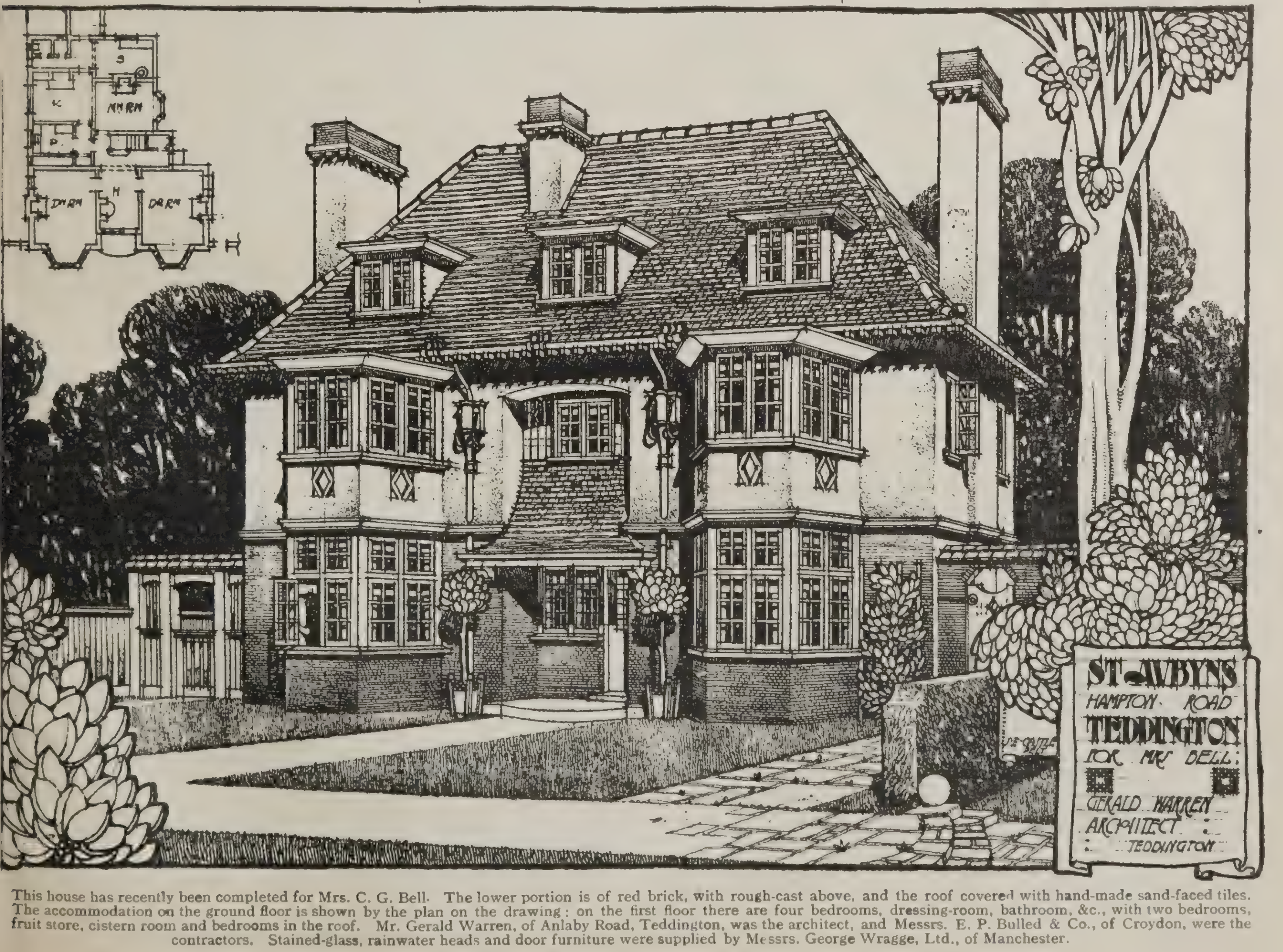
American Brickwork. — The ordinary method of bonding a brick wall in the States is for a highly-paid mason to build up the outside 4ins. and put a bond, sometimes a course of ordinary headers or a course of Flemish headers, about once in every five courses, sometimes merely a piece of wire tieing into the backing, which is being built up by bricklayers at a lower price and laid in anyhow. As any building in America is liable to be pulled down within ten or fifteen years of the time it is built, no one lays very much emphasis on questions of great durability.

Gloucestershire Architectural Association —At last week's meeting of this recently-formed Association, held at Gloucester, Mr. F. W. Waller delivered his presidential address, in the course of which he referred to the various societies of architects throughout the country, and pointed out the advantage of such organisations in helping forward the profession, and in educating the public to an appreciation of the value and importance of engaging fully competent architects for the execution of public and other work.—It was decided to hold the next meeting at Cheltenham.

An Architectural Exhibition in Edinburgh is proposed to be held in July and August next by the Edinburgh Architectural Association, to commemorate the Association's Jubilee, and also to give additional interest to this year's visit of the Royal Institute of British Architects to the Northern Capital. The exhibition will be limited to work executed in the course of the past fifty years by Scottish architects, with the addition of such old or special work as the committee may consider of sufficient interest: there may also be exhibits of the applied arts. Architects and others who have photographs and drawings which they consider of sufficient interest to be included in the exhibition should communicate with the exhibition secretary, Mr. John McIntyre, 28, North Bridge Street, Edinburgh, who will furnish further particulars.

Overcrowding in the Architectural Profession. — At the annual dinner of the Bradford Society of Architects and Surveyors held on January 25th the president, Mr. Charles E. Milnes, alluded to the growing competition amongst architects—largely owing to the training obtainable by youths in technical colleges—and strongly advocated that architects should use more discretion, and limit the number of pupils in their offices, as one means of checking the overcrowding. He further complained of the intrusion of county and municipal architects, and last, but not least, the growth of architectural departments attached to large industrial concerns. Allusion was also made to the inroads of the speculative builder. Mr. Milnes said he hoped the Architects' Registration Bill would soon be placed on the statute-book, as it was likely to be of the greatest advantage to the profession and to the general public.

Bristol's lost Fragments. — Writing in reference to the suggestion that Bristol should have "an architectural court" akin to that at South Kensington, Mr. H. Dare Bryan, president of the Bristol Society of Architects, says :—"We have homes for lost and starving dogs, but no last refuge for specimens of past art, which are not only interesting as being portions of the homes and temples of our forefathers, but are of direct value to students of architecture and the numerous handicrafts dependent upon it. What a collection of specimens of carved Gothic foliage, of Jacobean panelling and plaster-work, old Dutch and 18th century tiles, Georgian overdoors and fireplaces, how many a specimen of the glazier's art, the plumber's craft as exemplified in cast cisterns and spout heads, of smiths' work, hinges and other fittings, might not the city have collected within the past quarter of a century, all worthy of study, and many capable of reproduction for present-day needs, with improvement both to our taste and comfort."



This house has recently been completed for Mrs. C. G. Bell. The lower portion is of red brick, with rough-cast above, and the roof covered with hand-made sand-faced tiles. The accommodation on the ground floor is shown by the plan on the drawing: on the first floor there are four bedrooms, dressing-room, bathroom, &c., with two bedrooms, fruit store, cistern room and bedrooms in the roof. Mr. Gerald Warren, of Anlaby Road, Teddington, was the architect, and Messrs. E. P. Bulled & Co., of Croydon, were the contractors. Stained-glass, rainwater heads and door furniture were supplied by Messrs. George Wragge, Ltd., of Manchester.

Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

Feb. 7. Crosskeys.—*Alterations and additions* to the Tredegar Arms Hotel, Crosskeys, Mon., for Messrs. Lloyd and Yorath, Ltd. Quantities can be obtained and drawings inspected of Lansdowne & Griggs, architects, Metropolitan Bank Chambers, Newport. Tenders to be sent not later than 11 a.m. on Feb. 7.

Feb. 7. Sheffield.—*Alterations and additions at the Fire Station*, Rockingham Street. Quantities and plans may be obtained at the office of C. F. Wike, C.E., city surveyor, Town Hall, Sheffield, on payment of 10s. Tenders, endorsed "Alterations, Rockingham Street Fire Station," are to be sent in not later than 9 a.m. on Feb. 7, addressed to "The Chairman and Members of the Watch Committee, City Surveyor's Office, Town Hall, Sheffield." Fair wages clause.

Feb. 8. Yardley.—*Rebuilding of Tyseley Bridge*, situate on the Warwick main road, in the parish of Yardley. Drawings and specifications may be seen on application to J. H. Garrett, county road surveyor, Shire Hall, Worcester. Sealed tenders, endorsed "Tyseley Bridge," must be delivered to him not later than Feb. 8.

Feb. 8. Warrington.—*Erection of a public elementary school*, to be known as the "Bolton" Council School. Bills of quantities and instructions to builders and contractors, may be obtained from the Education Office on payment of £1 1s. The tenders must be delivered at the Education Office, Sankey Street, Warrington, in the envelope supplied (which must be securely sealed with wax), by not later than 12 noon on Feb. 8.

Feb. 9. Mountmellick.—*Building two labourers' cottages*, and fencing two plots in accordance with specification, for the R.D.C. Tenders to be considered on Feb. 9. For further particulars see placards, which can be had on application to R. Goodbody, clerk of the Council, District Council Office, Mountmellick.

Feb. 9. Carmarthen.—*Erection of a new Council school* at Ammanford to accommodate 500 children. Builders desirous of tendering are requested to send in their names to W. D. Jenkins, F.S.I., M.S.A., County Education architect, Carmarthen, on or before Feb. 9, together with a deposit of £3 3s. Bills of quantities, forms of tender, and full particulars will then be supplied to them.

Feb. 11. Stafford.—*Erection of Landywood new Council School*, Great Wyrley (accommodation 350). Builders desiring to tender for the work, should apply to G. Balfour, director of education, County Education Offices, Stafford, on or before Feb. 11. Quantities will be supplied, for which a deposit of £1 1s. will be charged.

Feb. 11. Wigan.—*Extension of the boiler-house*, engine-house, and other works at the Corporation Electric Generating Station, Bradford Place, Wigan. Bills of quantities may be had, and further particulars obtained, from J. Slevin, the electrical engineer. Sealed tenders, endorsed "Tender for Extension of Electric Station Buildings," to be delivered to H. Jevons, town clerk, Town Clerk's Office, Wigan, not later than Feb. 11.

Feb. 11. Dover.—*Alterations to the Pavilion* at the Athletic Ground, Crabble, Dover. Forms of tender, specifications, and bills of quantities may be obtained on payment of £2 2s., and conditions and drawings inspected, at the office of W. C. Hawke, C.E., borough engineer, Maison Dieu House, Dover, during office hours. Tenders, endorsed "Tenders for Additions to Pavilion," to be sent to W. Knocker, town clerk, Town Clerk's Office, Castle Hill House, Dover, on or before Feb. 11.

Feb. 11. Bury St. Edmund's.—*Erection of a covered grand stand* to accommodate about 3,500 persons, and other work in connection therewith. Plans and specification may be inspected and forms of tender obtained at the office of W. D. Harding, Assoc.M.Inst.C.E., engineer, The Town Hall, Bury St. Edmund's, between 9 a.m. and 5 p.m. Tenders, addressed to the Chairman of the Grand Stand Committee, Pageant House, Bury St. Edmund's, and endorsed "Tender for Grand Stand," to be delivered on or before 9 a.m. on Feb. 11.

Feb. 11. Hereford.—*Extensions to the buildings* at the Electricity Station in Widemarsh Street. Copies of the specification, with general conditions, bill of quantities, and form of tender, can be obtained at the office of J. Parker, A.M.I.C.E., city engineer, Hereford, upon payment of £1 1s. per copy. Tenders, sealed and endorsed "Tenders for Extensions to Electricity Station," addressed to the Chairman of the Electric Lighting Committee, must be in the hands of T. Lewis, committee clerk, Town Hall, Hereford, not later than 6 p.m. on Feb. 11.

Feb. 11. Londonderry.—*Erection of a building in Londonderry* for the purposes of a Higher School of Domestic Economy in connection with Victoria High School, for the Department of Agriculture and Technical Instruction for Ireland, in accordance with drawings and specifications which have been prepared by M. A. Robinson, C.E., M.R.I.A.I., M.San.Inst., Richmond Street, Londonderry. The drawings and specifications can be seen at the Architect's office, and also at the Offices of the Department, Dublin, and copies of the quantities obtained on payment of £1 1s. Fully priced details, under separate sealed cover, must accompany each tender, failing which **the tender will not be considered.** Tenders, under seal and endorsed, to be addressed to the Secretary, Department of Agriculture and Technical Instruction for Ireland, Upper Merrion Street, Dublin, and sent so as to reach the Offices of the Department **not later than Feb. 11.**

Feb. 12. Ilford.—*Erection of a refreshment kiosk* in South Park, Ilford, for the U.D.C. Copies of plans, specification, forms of tender, and further particulars may be obtained at the offices of H. Shaw, M.Inst.C.E., engineer and surveyor, Town Hall, Ilford, during the usual office hours, on payment of £2 2s. Sealed tenders on the printed forms supplied, endorsed "Tender for Refreshment Kiosk, South Park," to be delivered to J. W. Benton, clerk to the Council, Town Hall, Ilford, Essex, not later than noon on Feb. 12. Fair wages clause.

Feb. 13. Macclesfield.—*Erection of a new laundry* in Parker Street, for the Managers of the Macclesfield Certified Industrial School. Bills of quantities and particulars may be obtained of J. Wright, architect, 27, King Edward Street, Macclesfield, on payment of a deposit of 10s., where plans may also be inspected. Sealed tenders, endorsed "Tender for Laundry," to be addressed to the Chairman of Committee of Managers, and must be delivered at the Industrial School, Brook Street, not later than 2 p.m. on Feb. 13.

Feb. 14. Wolverhampton.—*Supply and delivery of lime* to the Sewage Outfall Works for the year ending March 31, 1908. Specifications and forms of tender may be obtained from W. Clifford, manager and chemist, Sewage Outfall Works, Wolverhampton. Sealed tenders, addressed "Chairman of the Sewerage Committee," and endorsed "Tender for Lime," to be left at the Town Clerk's office on or before 12 noon on Feb. 14.

Feb. 16. Coedpenmaen.—*Erection of a reading-room*, caretaker's cottage, &c., on site at Coedpenmaen, near Pontypridd, for the Workmen's Committee of the Albion Colliery. Plans and specifications may be seen of P. J. Jones, architect, Cilfynydd, or Tonyrefail, to whom sealed and endorsed tenders are to be delivered before Feb. 16.

Feb. 21. Alexandria.—*Construction* (*1*) *by Oct. 30 next*, of a ground-level warehouse covering 2,500 square metres, with foundations and ceiling of concrete; and (2), by Sept. 30, of a similar building covering 1,000 square metres, in accordance with conditions that may be seen at the office of the Chief Port Engineer, Alexandria, for the Egyptian Customs Administration. Offers, on stamped paper of 30 millièmes (to be obtained from Lieut.-Col. Western, as above), must be sent in registered envelope to "M. l'Ingénieur en chef des Ports," Alexandria, accompanied by a receipt for the deposit of £E.100 at the "Caisse des Douanes, Egyptiennes," Cairo. They will in each case be received up to Feb. 21.

Feb. 21. Nottingham.—*Enlargement of the Post Office* at Nottingham. Drawings, specification, and a copy of the conditions and form of contract may be seen on application at the Head Post Office at Nottingham between 11 a.m. and 4 p.m. Bills of quantities and forms of tender may be obtained at the Office of Works, Storey's Gate, on payment of £1 1s. Tenders must be delivered before 12 noon on Feb. 21, addressed to the Secretary, H.M. Office of Works, &c., Storey's Gate, London, S.W., and endorsed "Tender for Nottingham Post Office Enlargement."

Feb. 26. Dartmoor, Parkhurst and Portland.—*Supply of building materials* to Dartmoor, Parkhurst, and Portland Convict Prisons. Persons desirous of tendering for the supply of timber, deals, bricks, lime, cement, sand, slab, and roofing slates, &c., for new buildings for the period ending March 31, 1910, are requested to deliver their tenders prepaid to the Directors of Convict Prisons, Home Office, Whitehall, S.W., on or before Feb. 26, 1907, at noon. Forms of tender can be had on application to this office.

March 30. Palermo.—*Construction of new buildings* at an estimated cost of 2,705,538 lire (about £108,222), for the Committee of the Palermo Hospital. Contractors prepared to undertake the work must send documents (plan, specifications, &c.), to the Secretary of the Hospital at Palermo and deposit an amount as caution money not later than March 30, when tenders will be opened at 4 p.m. Further particulars may be seen at the Italian Consulate General in London, 44, Finsbury Square, E.C.

March 13. Ploesti and Constantza.—(*1*) *The construction of several buildings* adjoining the barracks in Ploesti, at an estimated cost of ings adjoining the barracks in Constantza, at an £6,400, and (2) the construction of several build- estimated cost of £8,000, for the Roumanian Ministry of War. Tenders for (1) must be sent in by March 13, and for (2) by March 14, to the "Kriegsminisatrium IV. Abteilung für Genie, Bucharest."

No date. Hillsborough.—*Erection of new Primitive Methodist* Sunday Schools, Hillsborough. Persons desirous of tendering may obtain quantities and all particulars on application to H. Harper, architect, 54, Long Row, Nottingham.

No date. Halton.—*Erection of ten houses*, Halton, near Leeds. Persons desirous of tendering are requested to forward their names to F. Mitchell, architect and surveyor, 9, Upper Fountaine Street, Leeds, at once (stating trade), and quantities will be duly forwarded.

No date. Pontefract.—*Erection of schools, &c.*, in Pontefract, for the Vicar of All Saints', Pontefract. Persons desirous of tendering are requested to forward their names to Garside & Pennington, architects and surveyors, Pontefract and Castleford, when bills of quantities will be supplied.

No date. Pontefract.—*Erection of operating theatre* and anæsthetic room at the Pontefract General Dispensary, for the Misses Robson. Persons desirous of tendering are requested to forward their names to Garside & Pennington, architects and surveyors, Pontefract and Castleford, when bills of quantities will be supplied.

ENGINEERING.

Feb. 11. Duston.—*Construction of a covered service reservoir* in the Parish of Duston. Drawings and specifications may be inspected and schedule of quantities and forms of tender, may be obtained on payment of £3 3s. at the Water Works Office, Fish Street. Sealed tenders, endorsed "Service Reservoir," must be delivered at the Town Clerk's Office, Guildhall, Northampton, on or before Feb. 11.

Feb. 12. Manchester.—*Reconstruction of Boardman Street Bridge* over the River Medlock. Drawing may be seen and specification, bill of quantities, and form of tender obtained on application at the City Surveyor's Office, Town Hall, Manchester, on payment to the City Treasurer of £2 2s. All cheques or postal orders are to be made payable to the order of "The Corporation of Manchester." Tenders, enclosed in the official envelope and addressed to the Chairman of the Improvement, &c., Committee, to be delivered at the City Surveyor's office, not later than 10 a.m. on Feb. 12.

Feb. 12. Manchester.—*Reconstruction of Waterloo Street* Bridge over Mill Goyt, Lower Crumpsall. Drawing may be seen and specification, bill of quantities, and form of tender obtained on application at the City Surveyor's Office, Town Hall, Manchester, on payment to the City Treasurer of £2 2s. All cheques or postal orders are to be made payable to the order of "The Corporation of Manchester." Tenders, enclosed in the official envelope and addressed to the Chairman of the Improvement, &c., Committee, to be delivered at the City Surveyor's office, not later than 10 a.m. on Feb. 12.

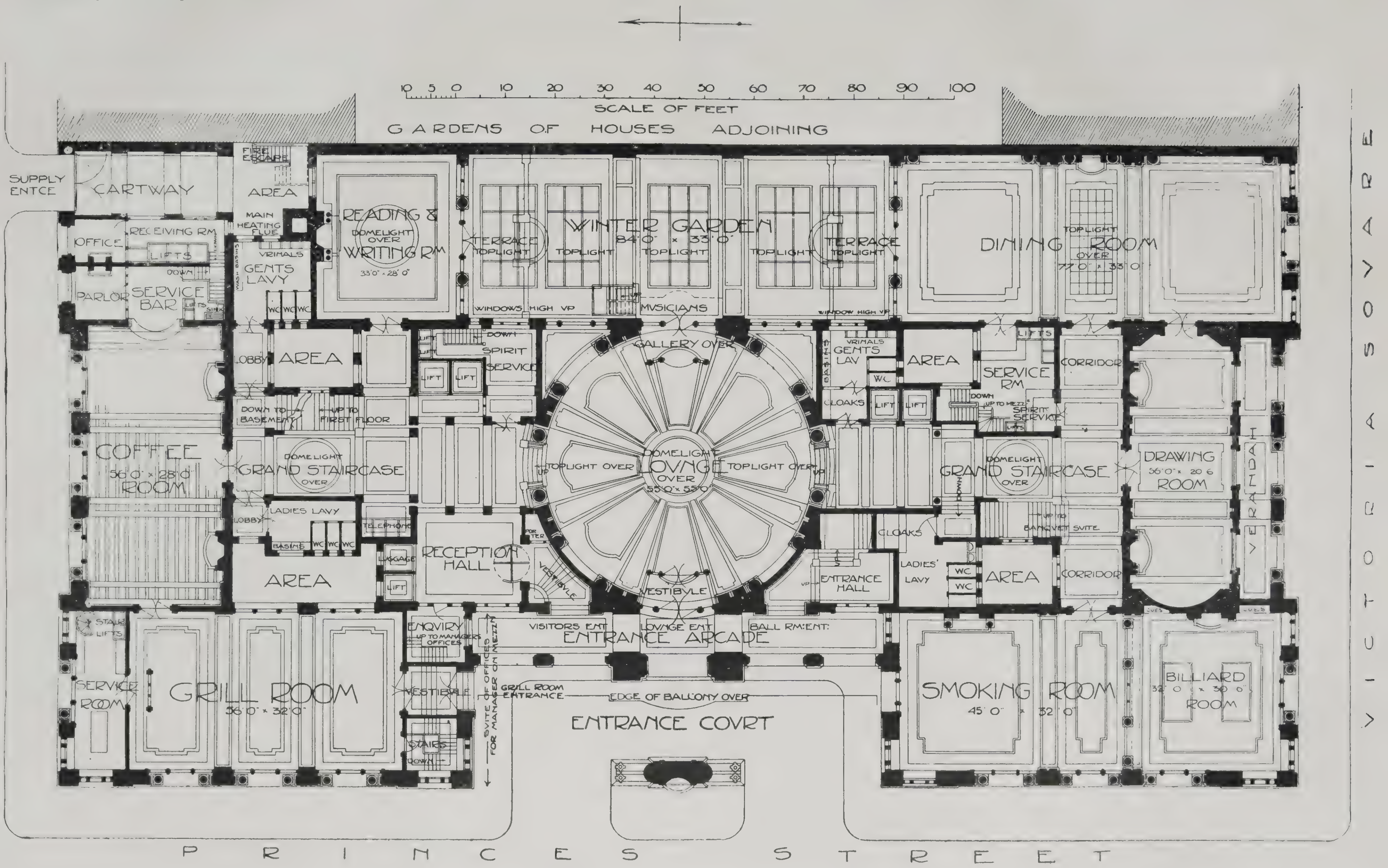
Feb. 13. Constantinople.—*Construction of the Dimotica Bridge* over the Maritza, near Couléi-Bourgas, vilayet of Adrinople, at an estimated cost of 2,700,000 piastres (£24,300). Tenders should be returned to the Ministry of Commerce and Public Works, Constantinople, not later than Feb. 13.

Feb. 18. Antwerp.—*Construction of a swing bridge* over the maritime lock of the Bonaparte Dock, at an estimated cost of 80,200 francs (about £3,208), for the Antwerp Municipal authorities. The specification (*cahier des charges*, No. 1,161) and the plans may be obtained from the Hotel de Ville, price 1 franc and 25 francs respectively. Tenders, in sealed registered envelopes, should be addressed to "M. le Bourgmestre de la Ville d'Anvers, Hotel de Ville, Antwerp," and should arrive there not later than Feb. 18. A deposit of 5,000 francs (about £200) is required to qualify any tender. A copy of the specification may be seen by British builders at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

Feb. 23. Harrogate, Contracts No. 1 and 2.—*Construction of a light railway*, 2ft. gauge, about $1\frac{1}{2}$ miles in length (700 yds. of which is in tunnel and cut and cover), together with the necessary siding accommodation, bridge, &c., extending from the Bilton Siding of the North-Eastern Railway Company to their gasworks in Ripon Road in the Borough of Harrogate, for the directors of the Harrogate Gas Co. Copies of the specification and bills of quantities can be obtained at the office of the engineer on payment of £3 3s. Plans, sections, and all necessary information can be seen or obtained at the office of E. W. Dixon, M.Inst.C.E., engineer, East Parade, Leeds, or by appointment at 1a, Cambridge Crescent, Harrogate, up to 5 p.m. on Feb. 15. Sealed tenders, on the forms supplied, and endorsed "Light Railway," to be sent to H. Wilkinson, secretary and general manager, Gas Offices, James Street, Harrogate, not later than 10 a.m. on Feb. 23.

Feb. 23. Harrogate, Contract No. 5.—*Supply and delivery of a weighbridge* in connection with the intended light railway, for the Directors of the Harrogate Gas Co. All necessary information can be obtained at the office of E. W. Dixon, M.Inst.C.E., engineer, 3, East Parade, Leeds, up to 5 p.m. on Feb. 15. Sealed tenders, accompanied with complete specification, &c., to be sent to H. Wilkinson, secretary and general manager, Gas Offices, James Street, Harrogate, not later than 10 a.m. on Feb. 23, endorsed "Weighbridge."

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, February 13th, 1907.



SOANE MEDALLION FOR CITY HOTEL: GROUND-FLOOR PLAN.

Supplement to
The Builders' Journal and Architectural Engineer,
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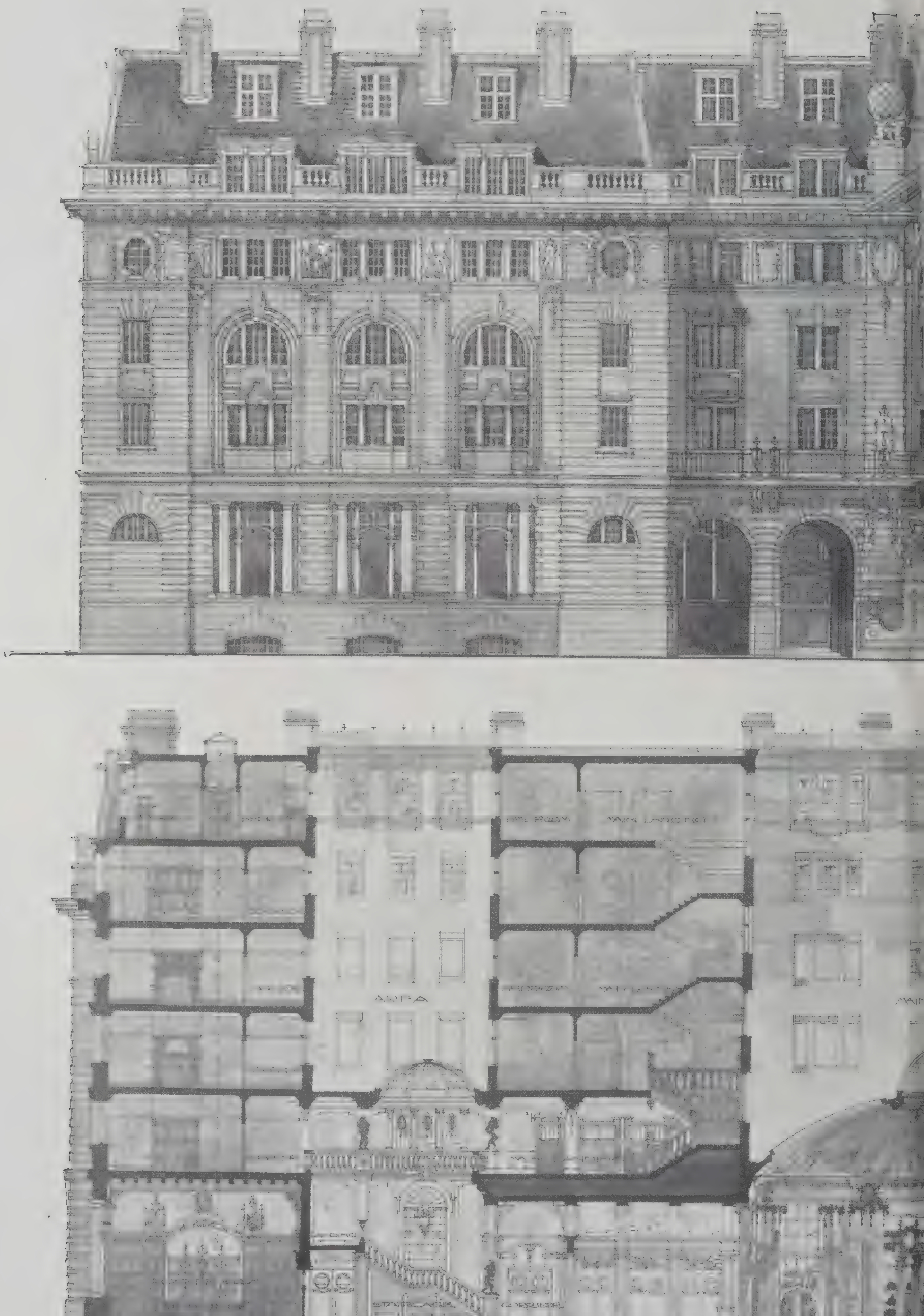

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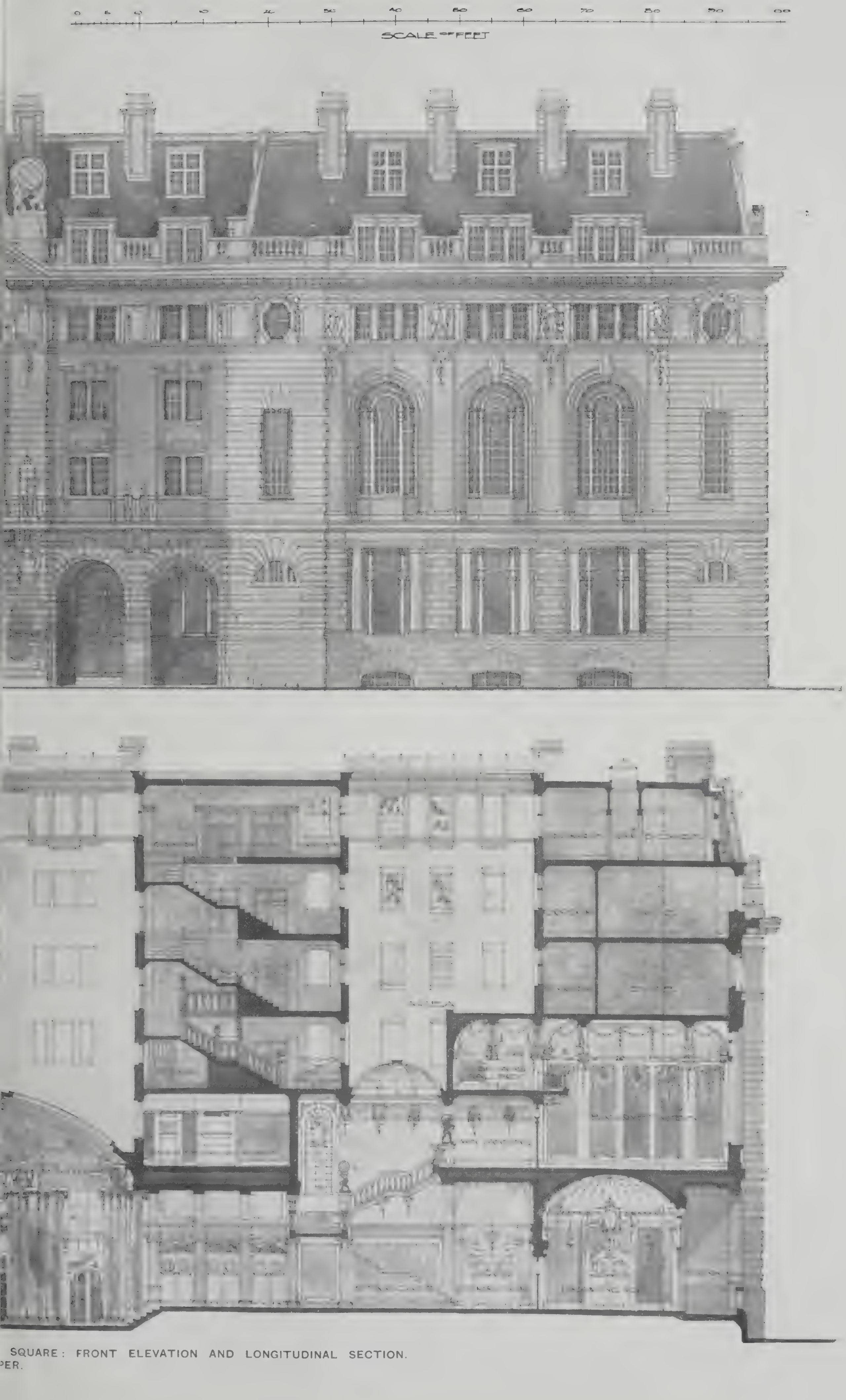

SQUARE: FRONT ELEVATION AND LONGITUDINAL SECTION.
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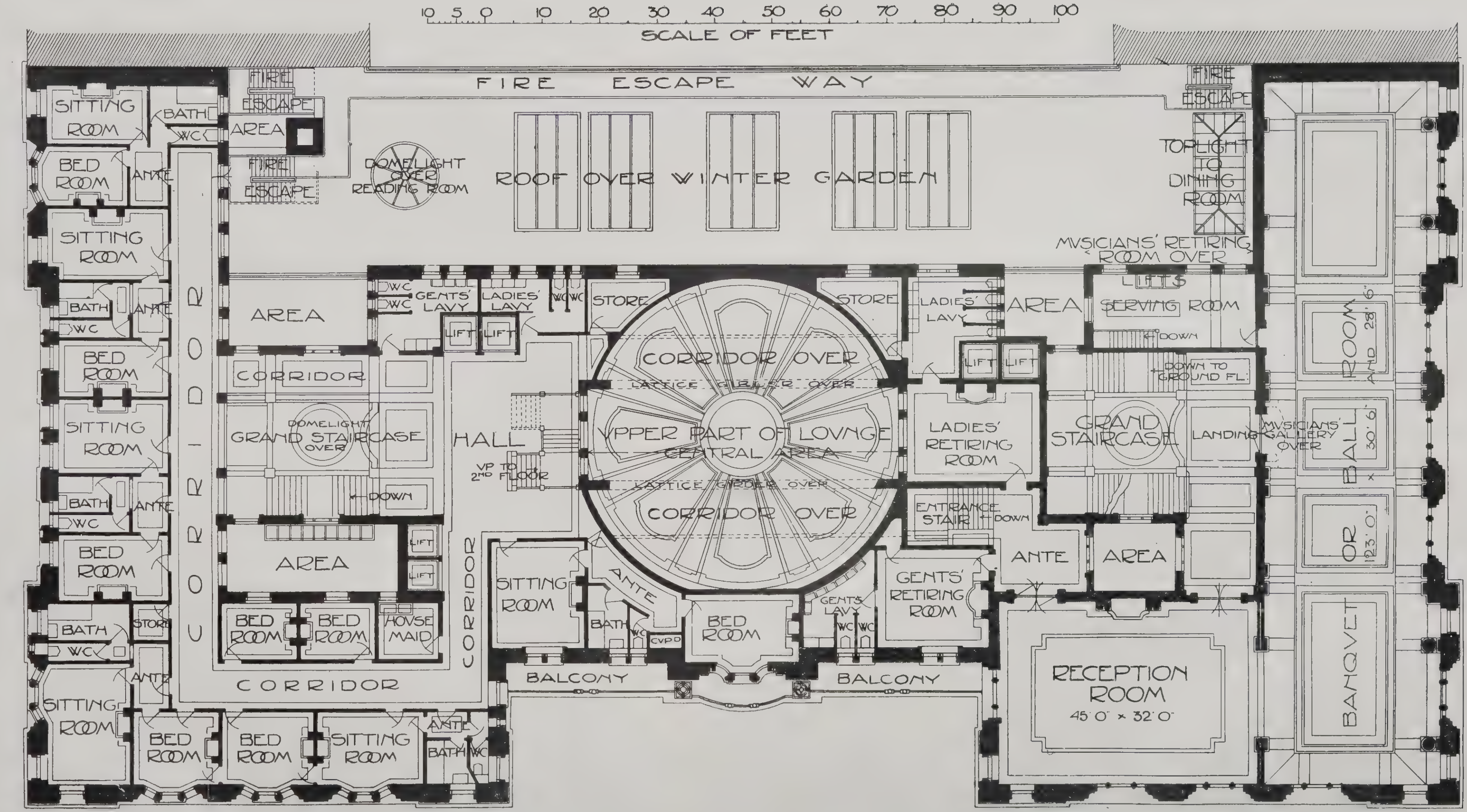
Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, February 13*th*, 1907.



SOANE MEDALLION DESIGN FOR CITY HOTEL: FIRST-FLOOR PLAN.

February 13, 1907. Volume 25, No. 627.

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AND ARCHITECTURAL ENGINEER.

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The Shop Window Question. IT will be recollected that when Mr. Norman Shaw's design for the rebuilding of Regent Street Quadrant was exhibited at the Royal Academy the shopkeepers protested strongly against what they considered to be a wanton deprivation of their window space in order to meet merely the æsthetic ideals of the architect. Mr. Macartney brought up the matter again in his paper last Friday before the Architectural Association, and it is opportune to consider the question quietly now, since the shopkeepers' protest has fizzled out long ago. Mr. Macartney considers Mr. Norman Shaw's design is the finest effort of modern times, but he doubts the expediency of making the piers between the shops so wide. While, of course, no advocate of the plate-glass method, he thinks that a little more deference should have been paid to the shopkeepers' views, more particularly as our eyes are now becoming trained to understand the stability afforded by metal columns. We hardly think, however, that the majority of architects will agree with Mr. Macartney. At last Friday's meeting, for instance, Mr. Henry T. Hare pointed out that the piers in the new Quadrant design were only 4ft. 6ins. wide, and that behind them were party-walls that could not be less than 14ins., and were more probably 18ins. thick, which only left a space of about 3ft., or a loss of 18ins. on either side of each shop: moreover, as he pointed out, the only class of shopkeepers demanding an enormous expanse of window space are drapers, and he did not think the class of drapers to whom this was a necessity would be likely to take shops in Regent Street, while for other businesses he was entirely unable to see that large window space was either desirable or requisite. Mr. Hare's remarks seem to us very sensible. In any case, if Mr. Macartney meant by his reference to metal columns that the ground-floor of Regent Street Quadrant should be supported in this way, such a design as Mr. Norman Shaw's would have to be abandoned. By all means let us frankly accept conditions arising out of reasonable desires, but art applied to what is crude and degraded will always show itself irrational and ugly. Of course, we admit Mr. Macartney's contention that metal columns can be used satisfactorily, for they are often economical both of labour and space. Generally, however, they need to be clothed as a protection against fire. Division walls must also be used for separation of fire risks. These two reasons, then, both necessitate piers of a goodly size in the present case. No doubt the craving for an immense expense of window space is a sign of the times, but to knuckle under to every whim of this kind, both unreasonable and detrimental to the general well-being, is not what will encourage a living architecture. There is a lasting quality in architecture which must ever place it a bit beyond the closest response to the ideas and fashions of the moment.

New, True, or Neither

Lord Rosebery continues to plough a lonely furrow in the political field, but in the architectural he is reversing the usual practice and beating his ploughshare into a sword. First there was the Auld Brig of Ayr business. Those callous Scots, forbye (I think forbye means "in spite of," but am not sure) their love of Burns, have been slow at finding the bawbees to save the Brig. Now there is waur (*Anglicé* worse) to follow. The late Lord Leven and Melville (one peer, two names) left money to restore Holyrood Chapel, if this course were approved. Prof. Lethaby was called in to advise, and recommended that there be *no* restoration, on the ground that it would amount to an entire rebuilding. Lord Rosebery is now desiring the blood of Mr. Lethaby.

* * *

The real trouble is that Mr. Ross, the well-known Edinburgh architect, was not consulted, but thinks that Holyrood can be and ought to be restored.

* * *

There seem to be two questions—one, the desirability of rebuilding a ruin; and the other, the comparative value of the opinions of Mr. Lethaby and Mr. Ross. Without desiring to depreciate Mr. Ross, whose painstaking labours in elucidating Scottish architectural history are worthy of all praise, it is not merely the prejudice of the Southron which suggests that Mr. Lethaby's authority in such a matter is almost unique in the United Kingdom.

* * *

I hope Lord Rosebery is not as angry as he sounds and that he will abstain from treating Mr. Lethaby with boiling oil or any Scots variant of a suitable medieval torture.

After all, if the Scots nation is really so anguished at the impending disappearance of the chapel, why did they not provide the stitch in time which saves nine letters to the newspapers?

Moreover, if Lord Rosebery goes on like this he will very seriously annoy Mr. Algernon Ashton. I should be sorry for that, because the one and only Algernon will say nasty things about the tombs of the noble ploughman's ancestors.

* * *

"Dosseret" is the name given to the stone which comes immediately over the capitals of Byzantine pillars. In present-day language a "dosser" is a man who sleeps in a "doss-house," and we should expect, therefore, a "dosseret" to be a "small dosser," for "et" is a Roman suffix making small. "Dos" is, of course, the French for "back," as also "doser" is French for small doses. Seeing, however, that the French language was of no account in the East at the time of the Roman Empire, there would seem to be no relation between "small doses in the back" of a pillar and a man who sleeps in a "doss-house," except perhaps that he only gets sleep in small doses when on his back.

* * *

"I hear this day that there is fallen down a new house, not quite finished, in Lombard Street, and that there have been several so, they making use of bad mortar and bricks." This is a very regrettable circumstance, and one may be tempted to ask what the district surveyor was doing. I hasten to dispel alarm by adding that the looker-on in this case is Samuel Pepys, and that the occurrence is 238 years old.

* * *

A very valuable contribution to the history of craftsmanship is the history of the Hammermen of Edinburgh just published. Their records run from 1494 to the present time, and their yearly accounts are full of interest. The Hammermen comprised eight metal-working trades, of which one, the Blacksmiths, touched building. The chief building crafts, masonry and joinery, were included in another incorporation, the Wrights.

It is rather a comfort to find that these Hammermen did not call themselves a guild. Why is it necessary for some modern people who lay out to do sound work to call themselves a guild? They are just as keen to get orders as any other collection of people who make to sell. Why guild? There is such a thing as protesting "craftsmanship" too much. But presumably the word "guild" pays. It is like the brown velvet office coat of the "art" architect. It impresses some people.

* * *

The Hammermen accounts clear up a point of interest to ecclesiastical architects and others who have to do with church fittings and ornaments.

It has been held by some who are knowledgeable in these things that flowers on church altars are to be abjured as modern novelties, and flower vases as dangerous heresies against which clients should be warned. There seems to be no need for alarm. The Hammermen were good Churchmen, and we find in their accounts :—

1507. For 3 payntit piggis to ye altar (piggis being earthenware jars) .... IXs.
1530. For gras to ye altar... IId.
1544. For candill and flowers to ye altar ....XIId.

These entries settle the point.

* * *

Though the art of the Renaissance has such an influence on modern architecture, the views of Vitruvius as to architectural education have been disregarded in one important particular. Benvenuto Cellini in his enchanting memoirs wrote :—"Andrea Cellini, my grandfather, was tolerably well versed in the architecture of those days, and made it his profession. Giovanni, my father, cultivated it more than any of his brothers; and since, according to the opinion of Vitruvius, those who are desirous of succeeding in this art should, amongst other things, know something of music and drawing, Giovanni, having acquired great proficiency in the art of designing, began to apply himself to music."

It is generally agreed that architects should know "something of drawing," but music finds no organised place in office routine. However, it may be worth the consideration of competitors for the L.C.C. Hall, as to whether a gramophone chanting "The Rake's Progress" in the office, while they are planning, will not so attune their souls as to increase the chance of success.

THE LOOKER-ON.

THE ARCHITECTURAL ASSOCIATION.

Mr. Macartney's Paper on Regent Street.

A meeting of the Architectural Association was held on Friday evening at 18, Tufton Street, Westminster, the chair being occupied by Mr. Walter Cave, vice-president.

It was announced that Mr. J. L. Denman and Mr. V. S. Whitaker had been elected members of the Association and that Mr. F. Dare Clapham had been nominated to fill the vacant seat on the Council.

Mr. Mervyn E. Macartney, F.R.I.B.A., then read a paper on "Regent Street." Under this title he incorporated the entire route from St. James's Park to Regent's Park, since to have omitted Waterloo Place and Portland Place would have cut out two of the most interesting portions of the matter in hand.

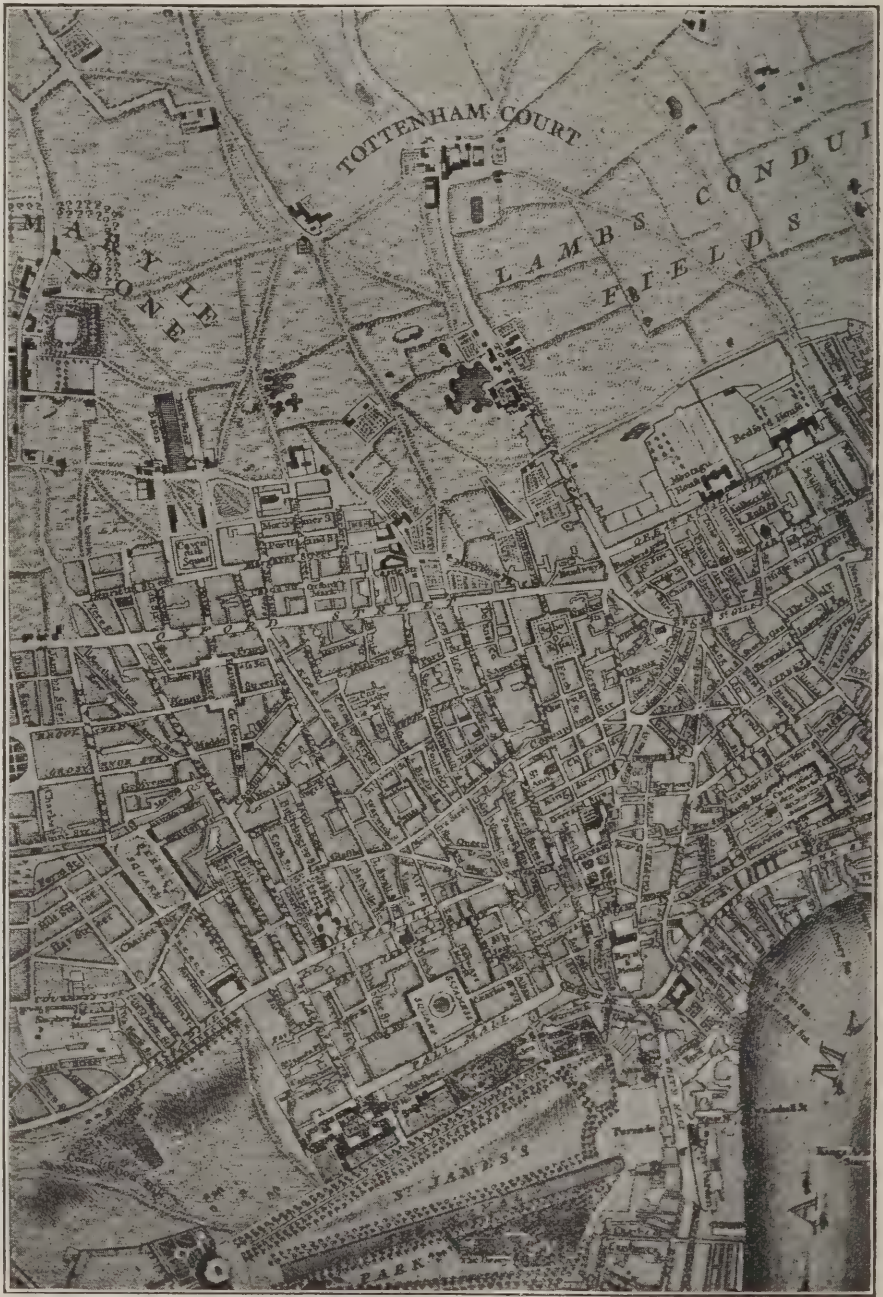
Mr. Macartney divided his paper into three sections—the first dealing with the history of the site; the second with its laying out and construction up to the lamentable year when the Hanover Chapel was destroyed; and the third embracing its subsequent history up to the present day, with some speculations about the future.

Early History.

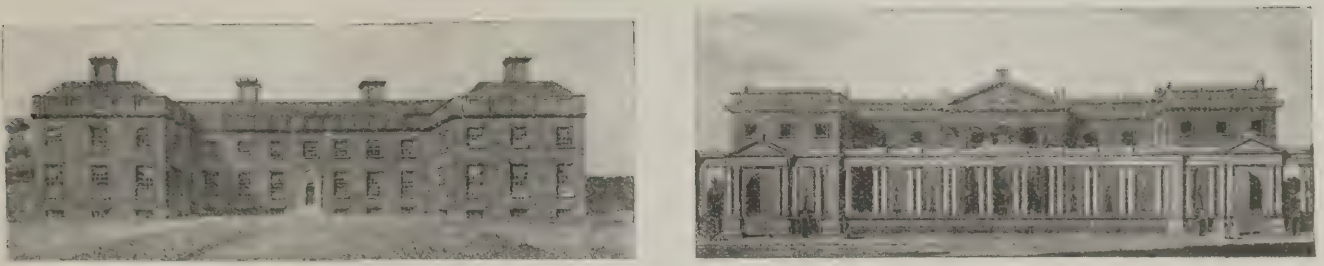
Beginning with the top end of the street, Mr. Macartney said that what is now Park Crescent was pasture land, known as Duppersfield, long after Portland Place had been erected. It formed part of Marylebone Park, which extended southwards to Mortimer Street, and was portion of a Royal manor belonging to Henry VIII.; the manor-house itself was situated nearly at the top of High Street, Marylebone.

"Marylebone" should really be "Marylebourne"—*i.e.*, the church of St. Mary by the burn, Tyburn. The district took its appellation in order to sever its connections with Tyburn, which had got into bad odour owing to the executions held at Tyburn gallows, which were situated at the south end of Edgware Road.

In some maps of the Portland Estate the region of Portland Place is set out differently from its present condition. The site of the Langham Hotel is put down as Queen Anne's Square, and from it



AN OLD PLAN OF THE REGENT STREET DISTRICT (ROKE'S SURVEY).



CARLTON HOUSE AS ORIGINALLY BUILT, AND AS ALTERED BY HOLLAND.

radiate two streets north-west and north-east, called respectively Langham Street and Portland Street.

This scheme was abandoned, and Lord Foley bought the Langham Hotel site, with the proviso that nothing should be built to interrupt his view to the north. Of the consequences of this, more will appear later.

But to come to Regent Street itself.

Information about the first period is meagre in the extreme; indeed we have to rely almost entirely on old prints. These show us a long, ugly, and irregular "street"—"Swallow Street"—frequented by people of more than doubtful reputation. Lord Macaulay tells us that in King Charles II.'s reign "he who then rambled to what is now the gayest and most crowded part of Regent Street found himself in a solitude, and was sometimes so fortunate as to have a shot at a woodcock." At this time, it must be remembered, Oxford Street was a country road running between high hedges. This is practically all the information we have concerning the early history of Regent Street. It takes us back no further than the year 1600; but, indeed, the subject of the paper is comparatively a modern road, when we consider that Oxford Street, Piccadilly and The Mall can trace their history back almost to Roman times.

The Period of Reconstruction.

Before detailing the planning and reconstruction of Regent Street itself, we must tell of the building of Carlton House. Although this may seem at first sight to be somewhat irrelevant, it will be found afterwards to be most eminently to the point: for, had it not been for the existence of Carlton House, and Regent's Park as well, Regent Street might never have come into existence.

Carlton House

was built for Lord Carlton in 1709. On his death it went to his nephew, Richard Boyle, Earl of Burlington, the architect, who, in 1732, gave it to his mother, the Countess Dowager of Burlington, who, in her turn—and in the same year—sold it to Frederick Prince of Wales, the father of George III.

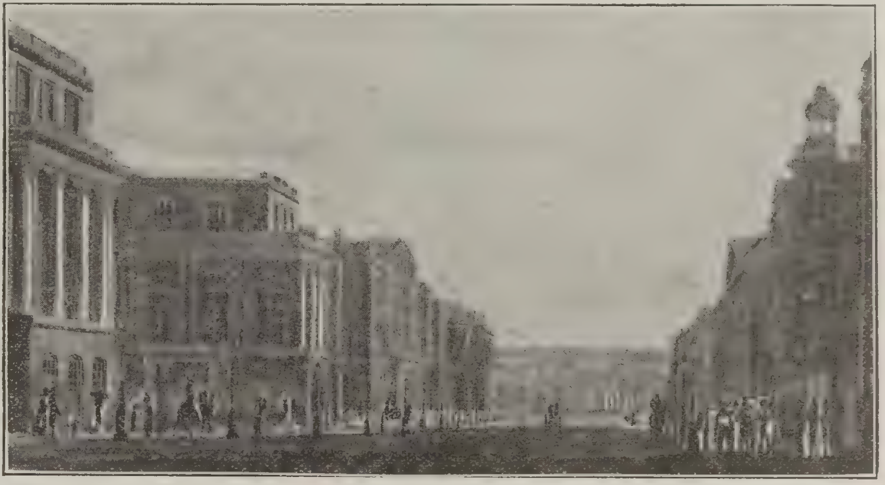
The house was originally of red brick, in the style of Queen Anne: but Prince Frederick, on taking possession of it, fronted it with stone. Sir Robert Taylor is said to have been the architect. [In 1734 Flitcroft, or some other, drew out a plan for its improvement.]

Attached to the house were large gardens, said by Walpole to have been laid out in imitation of Pope's gardens at Twickenham.

The house stood opposite what is now Waterloo Place, looking north, and the forecourt was later divided from Pall Mall by a long range of columns, supporting nothing. Hence the well-known lines :—

> Care colonne, ché state qua?
> Non sapiamo in veritá,"

which means literally "My dear columns, what are you doing there?" to which the columns are supposed to answer: "We haven't the faintest idea."



VIEW OF THE LOWER PART OF REGENT STREET, 1822.

Carlton House at the end of the view, St. Philip's Church to the right, Nash's house to the left.

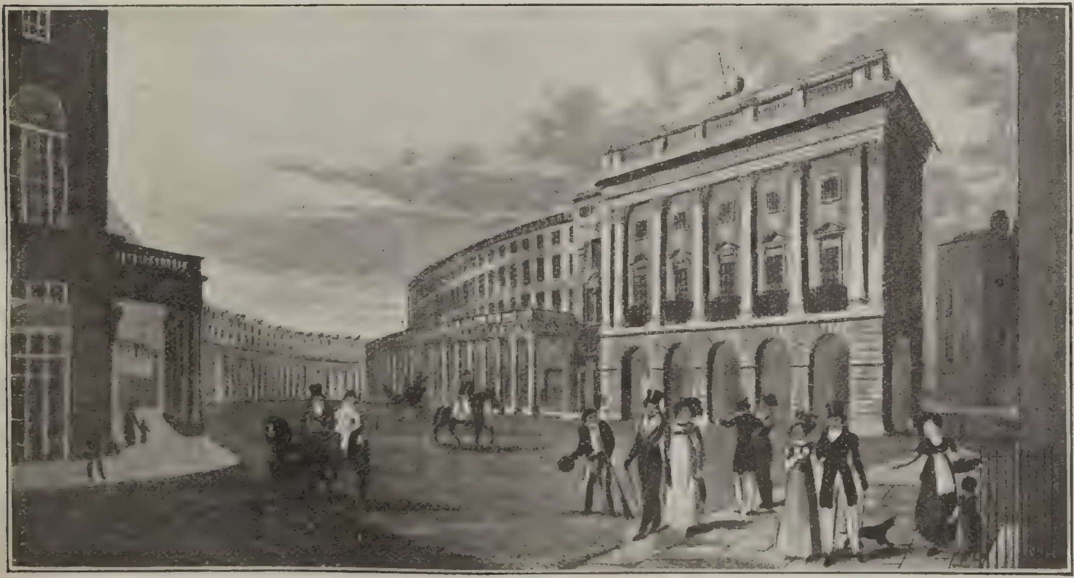
In 1783 Holland repaired and beautified the house for the Prince of Wales (afterwards George IV.). He added a portico with six Corinthian columns, taking his details from the temple of Jupiter Stator at Rome.

The house was modernised in 1788, and again, internally, in 1815.

In 1814, on the occasion of the visit of the allied sovereigns, the famous Nash designed a reception-room in the gardens of Carlton House. It had twenty-four sides, and a curious roof, and was 120ft. in diameter. Afterwards it was given to Woolwich, and is now a museum for naval and military models.

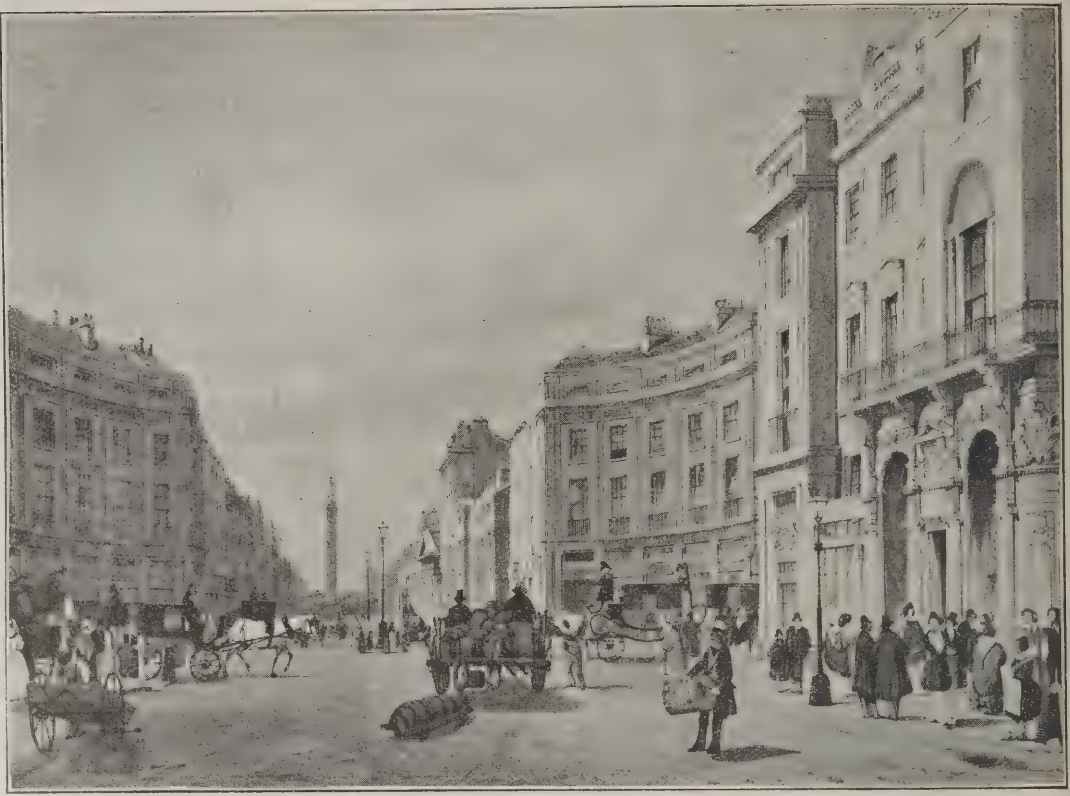
From descriptions in "The Beauties of England and Wales" it is evident that the interior of the house was of the most gorgeous description, but whether it was in the best of taste is very doubtful, as may be gauged from the accounts of a crimson drawing-room, a golden drawing-room, a "Gothic dining-room," and a "splendid" Gothic conservatory "designed after Henry VII.'s chapel."

Carlton House was pulled down in 1828, to make room for the central opening of Waterloo Place. Some of



REGENT STREET QUADRANT AS ORIGINALLY BUILT WITH THE COLONNADE.

the Corinthian columns from the colonnade were used in the portico of the National Gallery, while other columns were employed in the chapel at Buckingham Palace: the interior decorations were also, for the most part, removed to the Palace.



PICCADILLY CIRCUS AND REGENT STREET, LOOKING TOWARDS THE DUKE OF YORK'S COLUMN

Regent's Park.

In July, 1793, the Treasury offered a premium of £1,000 for the best plan for building on the Marylebone Estate. John Nash, who was the architect and surveyor to the Woods and Forests Commission, and also one of the architects attached to the Board of Works, submitted a plan, in which he was assisted by James Morgan, a former pupil, showing detached villas. There was also sent in a plan by Leverton and Chawner, of a more urban character, and also one by White. Nash's plans were approved. After this the Crown obtained an Act of Parliament and appointed a Commission to form a park in accordance with Nash's plans. Marylebone Park, as Regent's Park was then known, was begun in 1812, and about the same time Park Crescent and Square, and the adjoining streets, were completed.

At this time the Prince Regent conceived the notion of building a mansion for himself in the park, and desired some means of communication with Carlton House. This was

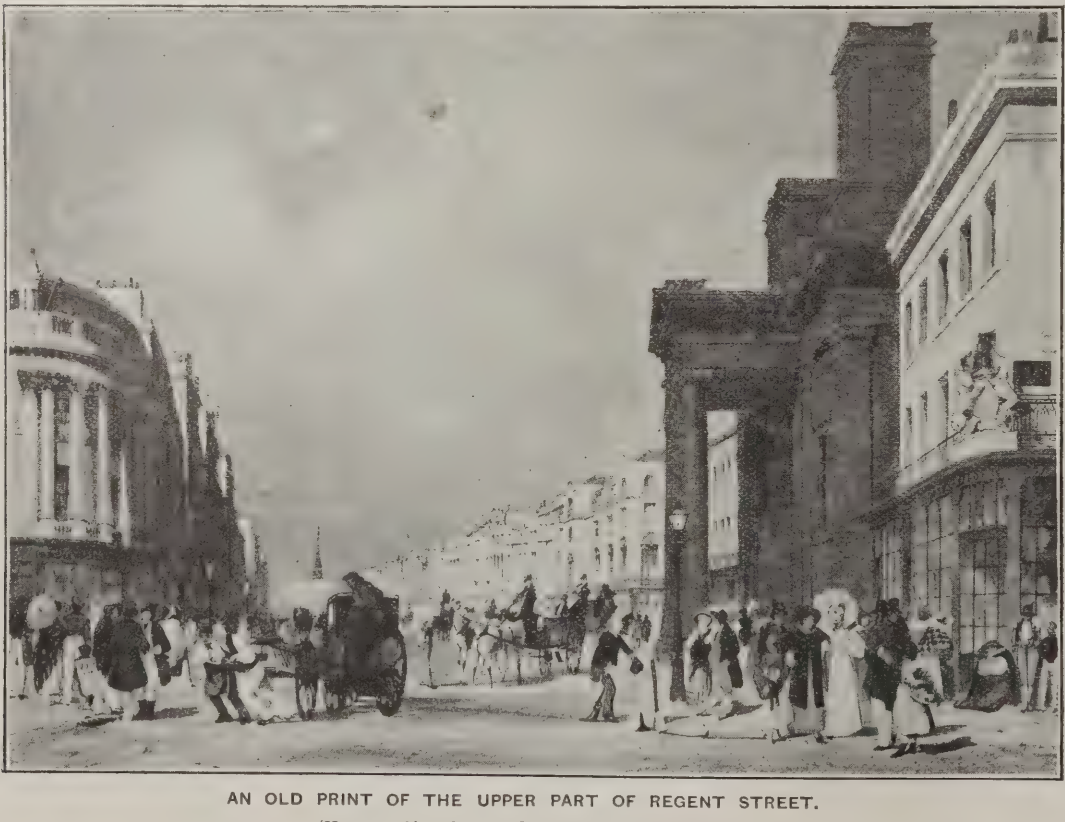
the genesis of Regent Street.

Nash was commissioned to lay it out, and in 1813 the work was actually taken in hand.

In the construction Nash did not find his way entirely smooth, though in one particular he was certainly fortunate.

When Lord Foley built Foley House in 1778, to the designs of James Wyatt, he had stipulated with the Duke of Portland, the ground landlord, that no other building should be erected to the north. Later this prohibition considerably embarrassed the Duke. But the brothers Adam, the architects, cleverly evaded the difficulty by building Portland Place, on a most sumptuous scale, of the same width as Foley House.

It strikes one as strange that such fine mansions should have been erected on this spot at a time when the new road had not been formed, and when Foley House blocked the south end of it (Duppersfield shut it in at the north end, so that it could only be approached by a roundabout route from Harley Street or Great Portland Street). Looking at the scheme as shown in contemporary plans, it does not seem a good speculation; but when Nash came on the scene all this was changed, for he made it the connection between his new street and Park Crescent.



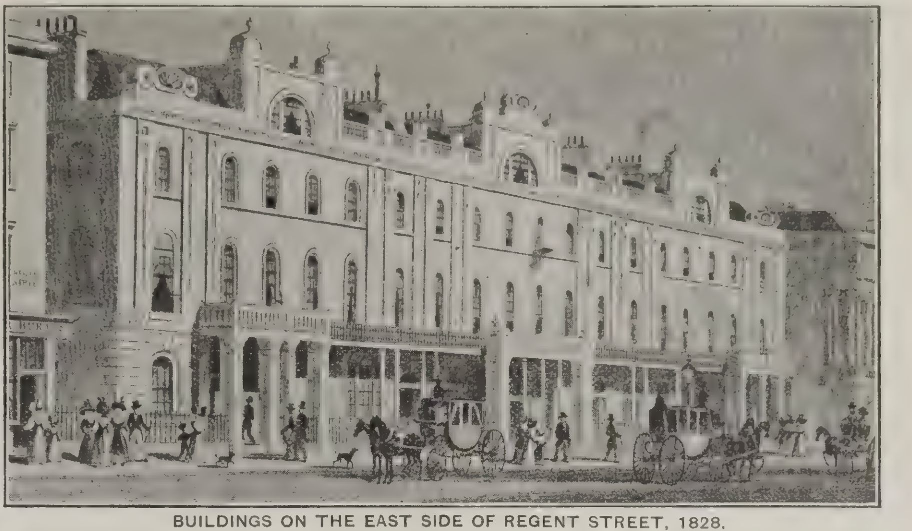
AN OLD PRINT OF THE UPPER PART OF REGENT STREET.

(Hanover Chapel—now demolished—to the right.)

So far Nash had his street ready-made, but to continue he had to buy up Foley House and grounds. This cost him £70,000. After this, through some disagreement with Sir James Langham, he was compelled to alter his plan of bringing his street straight over the site of Foley House, and constructed in its stead the present Langham Bend. The Quadrant also grew out of a change of plan, owing to the erection of the County Fire Office, by Robert Abraham, in 1819. Nash himself designed the façade. The portion of the street up to Piccadilly was finished by 1817, and the whole practically completed in 1820. The total cost of the street, including the sewer, was £1,533,582 16s. 10d.

Mr. Macartney here went on to describe the buildings of interest, which, for want of space, we can only summarise as follows:—

All Souls' Church (built by Nash between 1822 and 1824, the tower and spire of "this very original edifice" being



BUILDINGS ON THE EAST SIDE OF REGENT STREET, 1828.
(Site partly occupied by Robinson and Cleaver's new premises.)

almost detached, in order to be on the centre-line, and so form a striking termination to the vista).

The Argyll Rooms (built by Nash in 1816, burned down in 1834).

Foubert's Riding Academy (its name still preserved in "Foubert's Passage").

Hanover Chapel (built by Cockerell in imitation of the Temple of Minerva Polias, at Priene, at a cost of £16,180. Of the pillars of the portico, Ruskin said: "They look as if they were standing on a pile of pewter collecting plates." None the less, the general effect was undoubtedly fine. "That extraordinary monstrosity, Regent House, now stands on its site").

Trinity Chapel (erected on the south side of Conduit Street. It has since been built in, and is invisible from the street. In 1850, the endowment proving insufficient, the west end was cut off, and converted into shops).

The Quadrant.

We next come to the famous Quadrant. It originally had a colonnade of 270 cast-iron hollow pillars, 16ft. high, topped by a granite plinth. Of these columns, eight still remain across Air Street and Swallow Street. Above this, again, was a balustraded roof.

In its palmy days the Quadrant was the gayest and most crowded part of London, but owing to the complaints of the shopkeepers the columns were removed in 1848 and a balcony was added to the principal floor by Pennethorne.

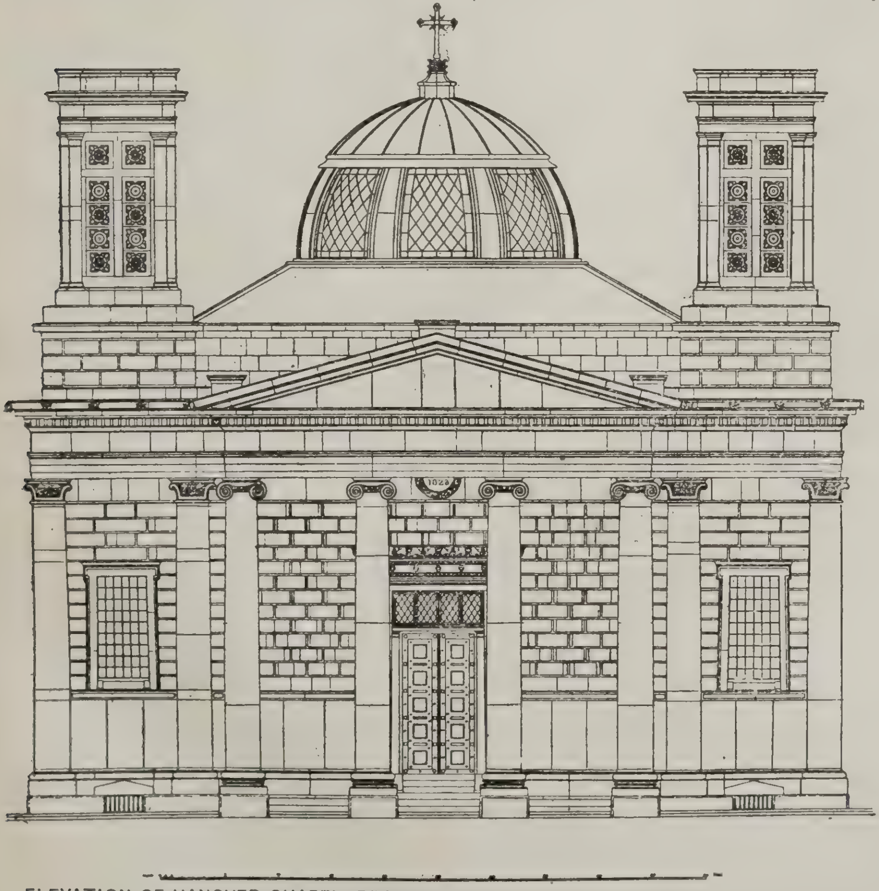
Nash was in a rather equivocal position in some of his dealings with the laying out of Regent Street, and more particularly with regard to the Quadrant. He seems to have acted both as the Government surveyor of the new street and also to have dabbled as a private speculator in acquiring property to carry through the scheme. He undoubtedly mixed himself up with the acquisition of the land bought for the Quadrant, and burnt his fingers over the job.

Of Piccadilly Circus it may be noted in passing that it was named after Piccadilly Hall, formerly written Pickadilla.

Having passed the Circus, we reach Nash's own house, built to his own designs. It is now occupied by the "Coupé Co." Nearly opposite was St. Philip's Church, recently pulled down, the site being now occupied by a block of offices. It was built after the designs of Sir William Chambers, by Repton, and was a copy of the choragic monument of Lysicrates at Athens. Owing to its position, the altar was at the west end, instead of at the east.

We are now at our journey's end, in Waterloo Place, which was designed by Nash, and is chiefly interesting for its literary associations.

Before proceeding to the concluding section of his paper, Mr. Macartney gave a brief life of John Nash, the originator and designer of Regent Street.



ELEVATION OF HANOVER CHAPEL, REGENT STREET. C. R. COCKERELL, ARCHITECT.

Life of Nash.

He was born in 1752, most probably at Cardigan, and as his parents were well-to-do he was placed with Sir R. Taylor, where he was a contemporary of Cockerell, Craig, Leach and others.

The following is a brief list of his principal works:—In 1797-9 he carried out alterations at Corsham House, Wiltshire. The north front of this house is Tudor Gothic. The cost of the alterations was £80,000, so they must have been of an extensive nature. The grounds were laid out by Repton, who afterwards claimed the whole design for himself and his son, then in Nash's office.

In 1799 he designed Sundridge Park, Kent, in the Italian style.

In 1803 he was commissioned to design Killymore Castle, Co. Tyrone (cost £80,000).

In 1812 he re-designed Highgate archway, which, begun in 1811 as a tunnel 24ft. wide, had fallen in early in the year.

On August 1st, 1814, there were held grand displays in the three parks in commemoration of the general peace. There were fireworks, miniature naval battles on the Serpentine, and similar festivities. As his contribution, Nash made a bridge and a Chinese pagoda at St. James's Park, and a Temple of Concord in the Green Park, which had first been suggested by Sir William Congreve. The bridge, although originally intended to remain for one night only, was afterwards strengthened by Mr. J. W. Hirst, and left as a permanent structure for several years.

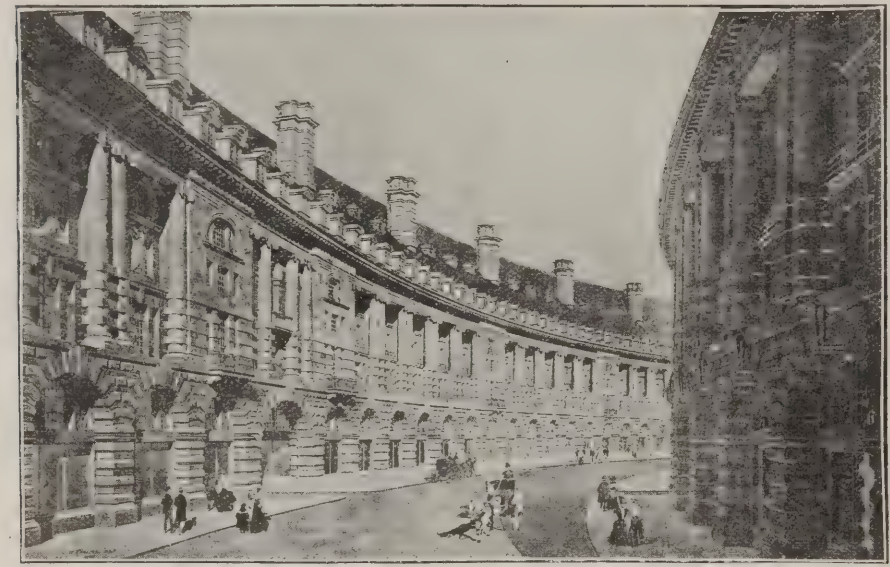
It was at this time that Nash first came into contact with the Prince Regent, and gained his favour, thus securing name and fortune.

Hence, when James Wyatt suddenly died, Nash was given temporarily the post of Surveyor-General, by command of the Prince.

For his patron Nash designed in 1814 the twenty-four-sided pavilion in the gardens of Carlton House, already noticed.

In 1816-18, in collaboration with Repton, he altered and enlarged the Opera House in the Haymarket, adding an arcade, and colonnade of cast-iron columns, since removed.

In July, 1793, his design won the premium offered for the Marylebone Park. The only terraces not designed by Nash are Cornwall Terrace and Munster Terrace,



DESIGN FOR THE REBUILDING OF REGENT STREET QUADRANT.
R. NORMAN SHAW, R.A., ARCHITECT.

which was not built till 1827. He designed Park Crescent and Square, Albany Street and the adjoining streets, the Park villages, and the outer road of the Park.

In 1813-16 Regent Street was designed and carried out; in 1816 he built Argyll Rooms; in 1819 the front of the County Fire Office, and the Quadrant. In 1823 he built his own house in Regent Street, moving thither from Dover Street, where he had previously resided. For this house he employed painters in Rome to make copies of Raphael's pictures in the Vatican.

He also combined into one uniform façade the façades of several shops. This practice was continued by subsequent architects.

The years 1826-8 saw the construction of the United Service Club House, Pall Mall, and perhaps of Waterloo Place.

In 1825 Parliament made a grant for the repairing and enlarging of Buckingham House for George IV. On the strength of this Buckingham Palace was built, although the grant permitted no such extensive an undertaking. Nash was the architect. The "Marble Arch" was originally in front of the palace, whence it was removed in 1826. It is of Carrara marble, and cost £30,000.

Windsor Castle was also altered by Nash.

When St. James's Park was laid out in 1828, Nash was employed; but this was his last work of importance, for shortly afterwards he retired to Cowes Castle (I.W.), one of his own earlier designs. There he died in May, 1835, in his 83rd year.

Contrary to expectation, he left but little property, though he must have made enormous sums by his profession. In his old age James Pennethorne, a relative, carried through his works for him. Among his pupils was John Adey Repton, and among his clerks were Pugin, Foulon and Morgan.

"Considered as a builder," said Mr. Macartney, "Nash showed his originality by his employment of stucco, the use of which he practically introduced, and of cast-iron columns, by which he anticipated the present enormous use of iron and steel in architecture: while if we regard him as an architect and artist, we must admit that if his details were poor his conceptions were grand and magnificent. But it is for his planning that he deserves particular commendation. I doubt if many of my audience are aware that a perpendicular let fall from the west end of Park Crescent would hit the south end of Park Lane. It is an excellent object-lesson, showing how to cut a series of parallel lines by a diagonal. A similar problem was set when the Charing Cross Road had to be made. The contrast between the two is only too evident. Regent Street is an ordered and satisfactory lay-out: Charing Cross Road is a hopeless jumble: in many places it is difficult to pick it out from the other lines of traffic, whereas Regent Street never loses its identity. Why is this? The answer is simple. In the one case the line of the street was laid out by an engineer, in the other by an architect."

Coming, in conclusion, to

the future of Regent Street,

Mr. Macartney said there had been of late years five important reconstructions of buildings in this street—namely, Hanover Chapel, Waterloo Place, Robinson & Cleaver's, St. Philip's Church and St. James's Hall. "In the words of St. Paul, 'all things are lawful, but all are not expedient,' It is lawful to criticise all these designs, but, at the same time, hardly expedient. Accordingly I will not discuss the new façades in Waterloo Place: but I have described the destruction of the Hanover Chapel as lamentable, and this description suits equally well the erection of the building that replaced it, and even better the monstrosity erected by Robinson & Cleaver.

"I will say no more on this subject, but turn to the design for

the rebuilding of the Quadrant.

"This we have seen on paper, and can now fairly judge by the actual work. I confess that I view it with mixed feelings; the predominant one, admiration for the architect and the Office of Works; but together with this is present a haunting sense of fear that it is too good to last. I cannot divest myself of the feeling that it is not 20th-century architecture. I wish it were. I repeat 'all things are lawful,' but is it expedient that we should deliberately set ourselves in opposition to the tendencies of the age? Bad as they may be, they form a part of the essential spirit of the times. Now I consider this design to be the finest effort of modern times, and I pray for its success. In principle, too, it is absolutely right, but the old remark of the cynic, 'I don't believe in principle, but oh, I *do* in interest,' comes forcibly to my mind in this connection. If you are letting shops, you must consider the interests of the shopkeeper.

"Do not think that I would advocate the plate-glass construction; but I think there is a *via media*, by the use of metal columns, which would overcome the difficulty. For the eye is gradually being accustomed to estimate the strength of metal at its proper worth, and not to require that great bulk for its satisfaction which it does in other materials. It is not alone in this country that we are 'up against' this question, as our Transatlantic cousins would say. European and American architects are equally confronted by it. In 'the States' I have seen some ground-floor shop fronts that seem to me in a great measure to solve the problem. They had bronze columns that both were and *looked* strong enough to carry the superincumbent structure, and yet were not offensive in design nor obstructive to the display of goods."

A vote of thanks to Mr. Macartney for his paper (which was illustrated by a series of lantern views) was proposed by Mr. Henry T. Hare, seconded by Mr. H. H. Statham, and supported by Mr. Arthur Keen and Mr. Walter Cave.

Referring to Mr. Norman Shaw's design for the rebuilding of the Quadrant, Mr. Hare expressed his admiration of it and said he hoped the high standard thus set up would be carried out. The only possible way to secure architectural effect in streets was to have a regulation that individual buildings should not be rebuilt haphazard, but dealt with in blocks in an ordered manner. He did not agree with the criticism made in regard to Mr. Shaw's treatment of the shops. In his opinion the piers were not excessive: they were 4ft. 6ins. wide, and though a saving of 18ins. might be effected by following the usual unsatisfactory methods, that saving would really be of very little account: moreover, in an important street like Regent Street the shopkeepers' demands should not be taken as a necessity, but made to conform with the other view of the case, which concerned the architectural effect of a great civic improvement.

THE ACADEMY.

The sending-in day for architectural drawings for this year's Royal Academy exhibition is Thursday, March 28th, from 7 a.m. to 10 p.m.

All works must be under glass, in gilt frames, with the title of the work and the name and address of the author written on the back, and the same information given on a label tied by a string so to hang over the front. A form must also be sent to the secretary giving the titles of all works submitted, and the name and address of the author. (Forms and labels can be obtained *during March only* from the secretary of the Royal Academy, Burlington House, Piccadilly, W., all applications to be accompanied by a stamped addressed envelope.)

Not more than three separate works can be submitted by any one person.

As in former years, we shall be glad to receive any architectural works for exhibition and to deliver them free of charge at the Academy, after having made reproductions of such of them as we desire to publish.

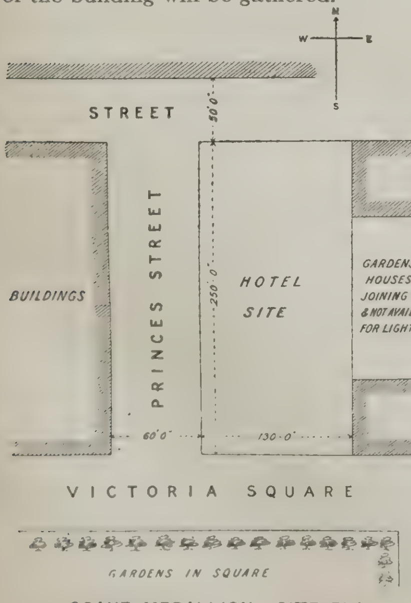
Our Plate

Soane Medallion Design for a City Hotel.

Mr. Harold Cooper sends us the following particulars of his design for a city hotel, which has gained the Soane Medallion this year:—

"Externally I have made an effort to express the purpose of the building. The detail is somewhat French and of a playful rather than severe character. The high semi-circular headed windows to the banquet-room suite match in general outline those on the other side, which enclose bays to two storeys of private suites. This treatment brings the elevation well into line. In the frieze below the main cornice the sculpture groups are intended to represent nations. The pediment and high feature in the centre of the court mark the entrance. On this feature I place the chief sculpture group, forming a centre to the cosmopolitan series. This group represents a Chinaman joining hands with a Red Indian—the meeting of East and West, so to speak. The elevations are intended to be in Portland stone, and the roof slated with the slates which Mr. Hare has used at Hammersmith Library and on his new building in the Strand. The cresting to ridges to be also cut in Portland stone.

"Speaking of the ground plan, the entrances have all been arranged from the court in the centre of the side clear of traffic. The principal apartments are all grouped at the south end, facing the open square, and these are arranged around a marble stair which connects them with the banquet-room suite on the first floor, when required in conjunction. The banquet suite can also be entered separately from the court. The lounge is placed centrally and entered direct from the court; a portion of the dome over is glazed, and light is also obtained from the winter garden. The visitors' entrance leads to the visitors' hall and second marble staircase, around which are grouped the coffee-room, reading-room, enquiry and manager's offices, lifts, telephones, &c. The grill-room is also provided with a separate entrance. The coffee room is decorated in Old English style; the other large apartments are modern in treatment, as will be seen from the section, from which also some idea of the central vista of the building will be gathered.



SOANE MEDALLION: SITE PLAN

"On the first floor the private apartments are shown around the visitors' staircase. These are quite cut off from the banquet suite by the dome to the lounge. In this way the plan has rather an irregular appearance, but this disappears on the second and higher floors, which are devoted entirely to private apartments, the staff bedrooms being nearest the roof.

"The supply entrance is from the back street, and to this as an exit the fire-escapes lead. Lifts, service rooms and conveniences are placed in suitable positions. Musicians' galleries are provided between the lounge and winter garden, and over the main landing for the banquet room. Both dining- and reading-rooms have terraces overlooking the winter garden, and a verandah is placed in front of the drawing-room overlooking the square to the south."

New London Buildings

At yesterday's meeting of the London County Council the Building Act Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics*.

Drawing, submitted by F. H. Payne, showing certain deviations with regard to the arrangements in connection with the Commercial Motor Exhibition to be held at Olympia from March 7 to 16, 1907. (*Consent.*)

Drawings, submitted by B. Crewe, of a Hippodrome proposed to be erected in Harrow Road. (*Consent.*)

Buildings abutting upon the western side of Godfrey Street, the southern side of Godfrey Hill, and the eastern side of Lower Wood Street, Woolwich, on the application of G. A. Wilkinson & Son. (*Consent.*)

Buildings on the western side of Fulham Road, Kensington, and abutting upon South Street, Alfred Place, North Terrace and Brompton Road, in connection with the application of W. G. Hunt, on behalf of Lady George Campbell. (*Consent.*)

Enclosing of a projecting porch in front of Durrant's Hotel, Nos. 26 and 28, George Street, St. Marylebone, on the application of Hudson & Hunt, on behalf of W. H. Gauntlett. (*Consent.*)

Two houses on the northern side and two houses on the southern side of Baldry Gardens, two houses on the northern side and one on the southern side of Heybridge Avenue, and 66 houses on the eastern and western sides of Copley Park, Streatham, on the application of C. M. Quilter, on behalf of Hill & Tyler. (*Consent.*)

One-storey shop in front of No. 71, Humbolt Road, Fulham, on the application of G. Slaney. (*Refusal.*)

Projecting shop front on the King Street frontage of a proposed addition to Nos. 95 and 97, High Street, Kensington, on the application of P. E. Pilditch, on behalf of J. Barker & Co., Limited. (*Consent.*)

Two blocks of flats on the north-western side of Pratt Street, Camden Town, with an irregular open space at the rear, on the application of F. E. Moore. (*Consent.*)

Water-closet addition over a portion of the space at the rear of No. 2, Edward Street, Soho, on the application of R. H. Kerr, on behalf of L. Phillips. (*Consent.*)

Building on the site of No. 26, Foubert's Place, Regent Street, with an irregular open space at the rear, and with projecting water-closets over a portion of such space, on the application of R. H. Kerr, on behalf of the trustees of the late W. Wright Ingle. (*Consent.*)

Building upon the site of Nos. 112, 114 and 116, Blackheath Road, and abutting upon Lewisham Road, with an irregular open space at the rear, on the application of J. H. Carte, on behalf of Harrison, Gibson & Co. (*Refusal.*)

Laying-out of a new street in continuation southward of Rivaz Place, Chatham Place, and connecting Rivaz Place with Retreat Place, Hackney. (*Consent.*)

Laying-out of new streets upon a site abutting upon the south-western side of Rosendale Road, Herne Hill, southward of Norwood Road. (*Consent.*)

Laying-out of two new streets for carriage traffic in continuation of Garland Street and Dothill Road, Plumstead, southward and eastward respectively, in connection with the application of Tuckett & Son, on behalf of O. E. l'Avigdor Goldsmid and J. Harper. (*Consent.*)

Laying-out of streets for carriage traffic out of the southern side of Bostal Hill, Plumstead, on the Old Park Estate, on the application of C. R. Hager, on behalf of A. T. Cook. (*Refusal.*)

Building to exceed in extent 250,000 but not 450,000 cub. ft. at the rear of the Imperial Tobacco Co.'s premises, No. 81, Fulham Palace Road, on the application of the Imperial Tobacco Co., Ltd. (*Consent.*)

Notes and News

Messrs. Vulcanite, Ltd., makers of the well-known Vulcanite roofing, have established offices at Parr's Bank Buildings, York Street, Manchester, for the purpose of keeping closely in touch with their rapidly developing trade in the North of England.

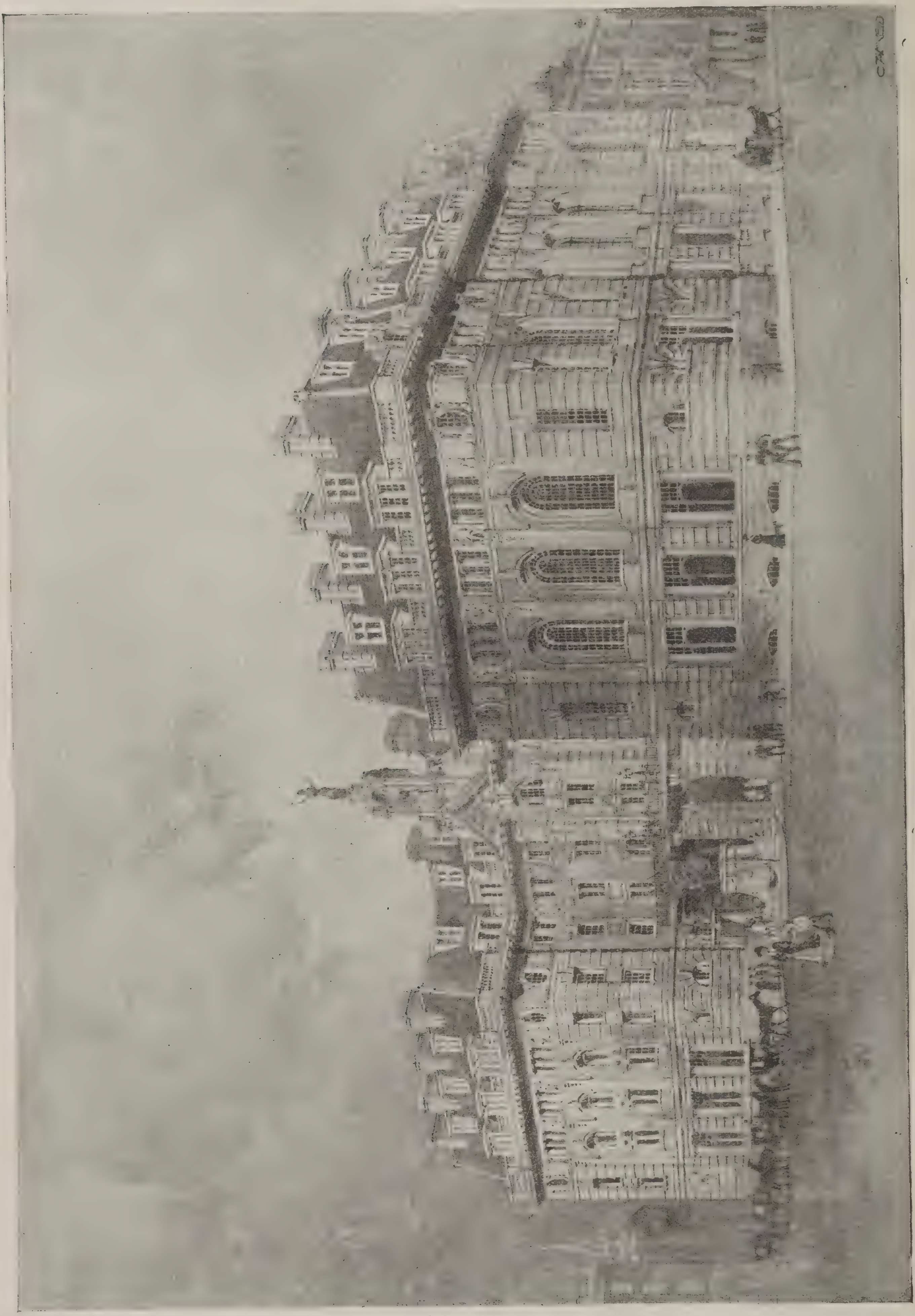
The Society of Architects.— A well-got-up pamphlet has just been issued giving a brief account of the Society's aims and scope, with particulars of membership, &c.

Messrs. Mappin & Webb's new premises in Oxford Street (Mr. John Belcher, architect) are being pushed forward with great speed. The external walls are to be faced entirely with marble, so that the building will have a very imposing appearance. All the floors and roofs will be constructed of combined reinforced concrete and hollow terra-cotta blocks by the Kleine Patent Fire-Resisting Flooring Co.

An Architect's Diary.— Messrs. Waterlow Brothers & Layton, Ltd., of 24 and 25, Birchin Lane, E.C., send us their 1907 diary and almanac for architects, surveyors and auctioneers. This diary has long been a familiar one on architects' desks, as, in addition to space for entries, appointments, &c., there is given in the book a great deal of very useful information, such as lists of members of the R.I.B.A., the Surveyors' Institution, the Institution of Civil Engineers, the Auctioneers' Institute, and other bodies; also the London Building Act, the R.I.B.A. contract form, building memoranda, &c., &c. The price of the diary is 6s. in half-calf, and 3s. 6d. in cloth gilt.

Architectural Association of Ireland.— At last week's meeting, held in Dublin, Mr. G. G. Lynes, who has recently returned from a prolonged tour in Spain, read a paper on "Water-colour Sketching." Dealing first with the history of the art of water colour, as known by the Egyptians, who, however, used white of egg as a medium for their mural decorations, the lecturer stated that water colour was not adopted to any considerable extent until the beginning of the 18th century: at the close of that century, however, water-colour painting was evolved from mere typographical work to a living art. The lecturer proceeded to give some particulars of pigments, his remarks being illustrated by numerous sketches made by himself.

Chester Cathedral was dealt with by Mr. W. H. Mitchell in a paper which he read before the last meeting of the students of the Manchester Society of Architects. The lecturer pointed out that the cathedral was built as a Benedictine monastery, the history of which he traced. Coming to the time of the Commonwealth, he showed how the Puritans in their fanatical enthusiasm had ruthlessly damaged the buildings. He also showed how the stonework had decayed, and dealt at some length with the early restorations. Slides were shown of the cathedral before and after Sir Gilbert Scott's great restoration, the lecturer pointing out the exceedingly careful and successful way in which Scott had carried out the work. Mr. E. Hewitt, F.R.I.B.A., who occupied the chair, agreed with this praise of Scott's restoration, which he considered to be one of the most successful that that architect ever carried out.



SOANE MEDALLION DESIGN FOR A LARGE CITY HOTEL FACING A PUBLIC SQUARE. BY HAROLD COOPER.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

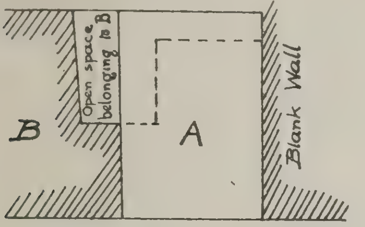
The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

The querist's name and address must always be given, not necessarily for publication.

Correspondents are particularly requested to be as brief as possible.

Adjoining Owners.

ENQUIRER writes: "I am preparing sketch plans for a client of mine on the piece of ground marked A on the accompanying plan, which has up to the present been vacant land. When the adjoining house B was erected, about 15 years ago, the freeholder of A was approached by the freeholder of B and an agreement was drawn up to the effect that should A at any future period wish to build on his land, his building was to be erected within the boundary indicated by dotted lines. I now find that the *tenant* of the house B, who has about 10 years of his lease to run, intends bringing an action against A in the event of his building in accordance with the said agreement. Can any claim be sustained by the tenant?"



As B's premises have only been erected about 15 years there can be no question of any claim for ancient light by B or by his lessee, even though no agreement were in existence. To secure such a right a window must have been in existence 20 years (practically 19 years and one day on account of the procedure necessary to block such a light) and I advise A to build in such a way as will carry out his old bargain with B—he may ignore the lessee entirely.

F. S. I.

South Kensington Examinations.

SCARBOROUGH. — THE OLD CASTLE writes: "Where can I get a copy of last year's examination paper set at the examination in architecture which all students must pass before being granted a pass in the Final Examination in building construction? I passed stage III. last May. Shall I have to pass the architecture examination this year and then sit for the final examination in building construction next year, May, 1908, or can I sit for both examinations this year?"

If the examination papers are published they can be obtained from Messrs. Wyman & Son, Fetter Lane, London, E.C., for 6d. nett, postage extra. The Honours Building Construction may be taken the same year as Architecture, or either one may be taken this year and the other next year.

HENRY ADAMS.

"Cribbed" Plans.

ANXIOUS writes: "Is it possible to prevent a district council or their agents from 'cribbing' architect's ideas (as shown on plans, when submitted for their approval) when about to erect workmen's dwellings under a model housing scheme? It really seems hard after an architect has invented, what he thinks to be, an ideal workman's dwelling, that a district council should erect a hundred or more of such dwellings on almost identically, or quite, the same plan."

The case referred to is a hard one; such action reflects no credit upon the local authority or their officers; but, short of copyrighting the plans, I know of no way in which you may prevent your drawings being bodily copied and used for other buildings. It is no new device—did not Mr. Pecksniff do it in one of the early chapters of "Martin Chuzzlewit"?

F. S. I.

Building Materials at Londonderry.

LONDON.—IOTA writes: "What building materials are available in the Londonderry district of Ireland? I may say economy is of the strictest importance."

The building materials available in the Londonderry district are—for walling, rubble stone and brick made locally. I cannot recommend the use of the local bricks for good work as they are generally soft and throw the cement plaster. Rubble masonry can be executed in rough walling at from 10s. to 12s. per yd. cube, and in squared or roughly-squared, with struck joints pointed with cement, at 20s. to 23s. per yd. cube. For cheap work rough rubble is used for walls from 18ins. to 20ins. thick, and either napdashed or cemented smooth on the exposed face, bricks being used for quoins. Good bricks have to be brought from Belfast or Carrickfergus, and stocks delivered at Londonderry station cost from 35s. to 36s. per thousand, and cost 20s. to 22s. per yd. cube laid, pointing extra. Slates, timber, cement, &c., are available the same as in any other large town.

M. A. R.

Damp coming through Wall.

KENT writes: "The gable end of a house built with solid timbers—internally battened, lathed and plastered, externally covered with expanded metal, and rendered with cement rough-cast—now shows signs of wet coming through into room in large patches. What would you suggest to remedy same?"

This case should be carefully investigated in detail upon the spot, as probably the wet penetrates in more than one way. I have several times found that driving rain from the south-west will penetrate at the bargeboards and eaves, run down *behind* the rough-cast and appear inside the building at the first spot where the moisture meets an obstruction in its downward course. Weathertiling is always a more certain method of rendering a wall weathertight than is rough-cast. Do your solid timbers extend to the exterior? If so, it is fairly certain that the rain enters along their edges. I should also investigate the window openings, joints and arches (if any).

X.

Agreement Forms for Small Jobs.

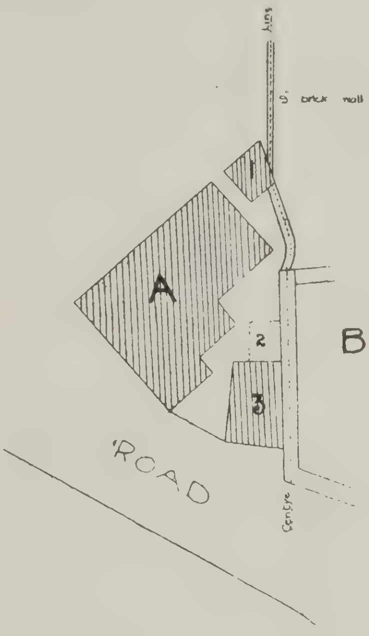
LEX writes: "Please suggest a short agreement form for a small job costing less than £100. In this case the R.I.B.A. form seems superfluous. Please also suggest a short agreement form for labour only, on a small job. Would a tender do with the addition of a few clauses, and stamped?"

Many such small works are daily carried out upon nothing more than the specification and estimate, without formal conditions of any kind, and very rarely does one hear of any legal difficulties arising from the absence of "conditions" in such cases. You will, however, find a short form in which they may be put on page 196 of "Specification," No. 6. Every architect has a simple set of conditions in general use and the R.I.B.A. set is not always employed, even in large works. I suggest that you draw up a short contract (conditions unnecessary) and that your contractor sign it over a sixpenny stamp.

F. S. I.

Division Walls.

CORNWALL.—OWNER writes: "The accompanying sketch shows the division wall between two properties. B claims it as his. The portion marked 1 is a w.c., one of the sides of which is the boundary wall. 2 is the position of a shed, now demolished, but whose rafters ran in the division wall, the holes for which still remain. I now wish to enclose the whole of this open space. 3 is a lean-to, the rafters of which run into the wall and the slates continue with B's roof. I wish to remove this shed and erect a new shop. Can I use the wall?"



I have grave doubts as to whether any of these are party walls at all; and from the details given I am of opinion that the walls in question may only be used by A to the very slight extent to which they are at present utilised.

F. S. I.

Fuming Oak.

GLASGOW.—BLYTHSWOOD writes: "Do you know of any books giving full particulars of the process for fuming oak? I note your reply in the issue for January 9th in regard to reducing the shade of fumigated oak, but my difficulty has been to get it dark enough."

We have described the method of fuming oak before, but as readers are frequently sending enquiries about the matter we may give again the following particulars of the process:—The wood is subjected to the fumes of ammoniacal gas in a room, compartment or box previously rendered air-tight by having all openings or crevices carefully pasted up. A small room or cupboard in which the work can stand upright, and from 6ins. to 12ins. off the floor, is preferable, as if the articles to be fumigated are supported face downwards on bearers in a box the marks of the bearers will show in the finished work. Upon the quantity of gas liberated, and the size of the fumigating apartment, will depend the depth of colour obtained, but if a sufficient depth is not secured at the first fuming it can be deepened by a repetition of the process, although less liquor ammonia will be required *pro rata* if the fumigation is completed at one operation. With a room about 12ft. by 12ft. by 8½ft. high, packed pretty full of oak joinery, we have allowed three Winchesters of liq. ammon. fort. 0·880, and have found 24 hours later the whole of the gas to be spent and the work of a beautiful dark colour, the gas fumes having penetrated the surface of the wood about $\frac{1}{16}$ in. The chief advantage of fumigation is the evenness of colour obtained without the grain of the wood being raised in the slightest.

Notes on Competitions

School, Southport.

The Southport Education Committee have decided to invite architects practising in Lancashire to compete for an elementary school for 1,000 children.

Nurses' Home, Wolverhampton Hospital.

The competition for the nurses' home to be erected at the General Hospital, Wolverhampton (for which designs were sent in by December 31st last), is expected to be settled on February 17th.

Model Cottage Competition, Newcastle-on-Tyne.

Messrs. Watson & Scott, of Newcastle, have been awarded the gold medal and the bronze medal in this competition, and Mr. T. Myddelton Shallcross, of Liverpool, has been awarded the silver medal. The designs will be exhibited in the Laing Art Gallery, Newcastle.

Royal Hants County Hospital, Southampton.

In a competition for the proposed new nurses' block to be erected at this hospital, the design of Mr. H. J. Weston, of Southampton, has been placed first, that of Messrs. Cancillior & Hill second, and that of Mr. Stopher third. The building is to cost about £3,000.

Henshaw's Blind Asylum, Manchester.

The competition instituted by the Committee of Henshaw's Blind Asylum for the rebuilding of Hayesleigh, Warwick Road, Old Trafford, Manchester, has been decided in favour of Messrs. Mangnall and Littlewoods, of Manchester, whose design is estimated to cost £25,843. The new building will form a training school for blind children.

Cottages, Ballinasloe Asylum.

The twenty cottages at Ballinasloe Asylum for which competitive designs are invited are to contain kitchen, sitting-room and three bedrooms, with fowl-house, pigsty and sanitary accommodation. They are to cost not more than £110 each. Prizes of £10 and £5 are to be awarded for the two designs placed first and second respectively, and the conditions state that the plans and specifications "shall thereupon become absolutely the property of the committee." There is evidently to be economy at Ballinasloe.

Model Village, Brodsworth.

Seventy designs were sent in for the lay-out of the model village at Brodsworth. The successful competitors were Messrs. A. and J. Soutar, of 59, Westover Road, Wandsworth, S.W.

Model Cottage Exhibition, Sheffield.

In this competition the gold medal has been awarded to Messrs. W. Alex. Harvey and A. E. McKewan, of Birmingham, the silver medal to Messrs. Currey & Thompson, of Derby, and the bronze medal to Mr. Claude Batley, of Kettering and London. Twenty-six designs were submitted.

Dundee Technical College.

A new technical college is proposed to be erected at Dundee and plans of the building have been prepared by Mr. Robert Gibson, architect, of Dundee, comprising everything except the frontage of the block of buildings facing Bell Street. There seems to have been some delay with the scheme owing to the fact that sufficient funds for the work were not forthcoming, but at the last meeting of the Technical Institute Committee it was decided that competitive designs should be invited for the main frontage and that conditions of the competition should be issued forthwith. The competition, however, is limited to Dundee architects.

Discontent about the Peace Palace Competition.

A row seems to be brewing about the award in the competition for the Peace Palace at The Hague. It is hardly necessary to remind readers that the amazing design placed first was, to put it politely, not such as to command appreciation from architects of education: but, in the majority of cases, however much protest may be raised against competition awards, the protest generally peters out after a period of more or less active abuse. In regard to the Peace Palace, however, a much more vigorous line of action is being taken, as proceedings against the Carnegie Fund are to be commenced in the Dutch Courts by the Committee of Dutch architects on the ground that the conditions of the competition have been grossly violated in the selected design, both as regards estimated cost, area, and other details. English architects who are interested in the endeavour to get the award cancelled should communicate with Mr. A. Lind, 687, Prinsengracht, Amsterdam.

The County Hall.

The Establishment Committee's report on the competition for the new County Hall was brought up before last week's meeting of the London County Council, and, after some discussion, was adopted. With regard to the proposal that the 5 per cent. on the total cost should be divided in the proportion of nine-tenths to the successful architect and one-tenth to Mr. Riley (the Council's architect), Mr. Lewis characterised this as very extravagant, so far as their own architect was concerned, and moved that the matter should be referred back. Sir T. Brooke-Hitching seconded this, declaring that a building of half the cost of that contemplated was all that was necessary. Mr. Howell Williams contended that 5 per cent. was not too big a fee, as the building would necessitate thousands of drawings being made. Mr. E. White held that if the Council's architect was to be the paid assistant of the successful architect, there was sure to be difficulty and disaster, and he deprecated such a policy. In the end, however, the amendment was defeated, and, as stated, the Committee's report was approved. An announcement that the conditions are ready may, therefore, be looked for very soon. The deposit for them will be three guineas.

Competition Methods in Germany.

From a letter which appears in "The American Architect" we extract the following particulars of German competition methods:—The system was formulated by the united German architects' and engineers' societies in 1897, and revised at the 33rd convention of their delegates at Dusseldorf in 1904. The competitions held are of various classes, comprising those open to all the world, those limited to German architects, those limited to architects residing in certain districts, and those for which a selected number of architects are invited to submit designs. Sketch competitions are recommended for all large buildings. It is insisted that the number of assessors shall be uneven, that the majority of them shall be architects, and that the programme shall be agreed upon by the assessors before publication. The method of assessing is as follows:—The entire board examines and decides which sets of drawings are entitled to consideration, and also weeds out the palpably inferior designs. The remaining drawings are then thoroughly examined by the technical members—the architects—of the board, and finally, the entire board awards the premiums. The assessors must publish the reasons governing them in making awards, and must furnish each competitor with a copy of their report; and all drawings, together with the assessors' report, must be publicly exhibited.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
Feb. 16	BATHS AT SALFORD (to cost £20,000). Names by this date to L. E. Evans, town clerk, Salford. Experienced architects only need apply.
Feb. 16	CONGREGATIONAL CHURCH, SCHOOL AND MANSE, GRIMSBY.—To cost £8,200. Premiums of 25, 15 and 10 guineas. Particulars from E. L. Bridge, Fish Docks, Grimsby. Deposit £2 2s.
Feb. 20	CHURCH AT LIVERPOOL.—To cost £7,500. Limited to architects in Lancashire. Particulars from Rev. G. Peters, 71, Hope Street, Liverpool.
Feb. 26	CHURCH HALL, STOCKTON-ON-TEES.—To cost £1,500. Particulars from A. Livingstone, 24, Russell Street, Stockton-on-Tees.
March 1	SMALL HOLDINGS, ROSSALL (Houses actually built).—Prizes of £100, £50, and £25. Applications for plots by this date. Particulars from Secretary, Estate Office, Fleetwood, Lancs.
March 3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25. Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford, Yorks. Deposit 10s. 6d.
March 15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham.
March 30	PRESBYTERIAN CHURCH AT ROKER, SUNDERLAND.—Premiums of £25 and £15. Particulars from George W. Bain, 46, John Street, Sunderland.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans	per qr.	1	10	0	1	12	0
Clover, best...	per load	4	7	0	4	17	6
Hay, good	do.	4	0	0	4	5	0
Sainfoin mixture	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

MISCELLANEOUS.

		£	s.	d.	£	s.	d.
Bricks Stocks, d/d to job	per 1,000	1	16	0	—		
Do. Flettons on rail ...	do.	1	6	0	—		
Do. Pressed Wire Cuts, d/d to job ...	do.	1	18	0	—		

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	106	5	0	107	0	0
Do. Strong sheets ...	do.	123	0	0	124	0	0
Lead, soft foreign... ...	do.	19	10	0	19	15	0
Do. English	do.	20	0	0	20	2	6
Do. pipes...	do.	23	5	0	23	10	0
Do. sheets	do.	22	15	0	23	0	0
Galvanised Corrugated sheets	do.	14	0	0	14	5	0
Spelter G. M.	do.	26	2	6	26	7	6
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	7	15	0	8	0	0
Marked bars, Staffs. ...	do.	8	17	6	9	0	0
Common bars, do. ...	do.	7	5	0	7	10	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	12	6	6	15	0
Angles, Midlands	do.	7	0	0	7	2	6
Joists do.	do.	7	2	6	7	5	0
Girder plates, Midlands ...	do.	7	15	0	7	17	6
Angles, Foreign, c.i.f. Thames	do.	7	10	0	7	12	6
Tees do. do. do.	do.	7	13	6	7	16	0
Joists, do. do. do.	do.	6	7	6	6	10	0
Channels do. do. do.	do.	6	10	0	6	15	0
Plates do. do. do.	do.	7	10	0	7	12	6
Tin, Foreign	do.	191	10	0	191	15	0
Do. English ingots ...	do.	193	0	0	194	0	0
Zinc, sheets, Silesian ...	do.	31	10	0	32	0	0
Do. do. V.M. ...	do.	31	10	0	32	0	0

TIMBER.

		£	s.	d.	£	s.	d.
Deals, Archangel, White, 1st, 3×9	per std.	12	0	0	—		
Do. do. do. 2nd, 3×11	do.	11	15	0	—		
Do. do. do. do. 3×9	do.	10	5	0	—		
Do. do. Yellow, 2nd, 2½×7	do.	12	0	0	—		
Do. do. do. do. 3×9	do.	15	0	0	15	5	0
Do. do. do., 4th, 3×9	do.	9	5	0	—		
Do. Asbacka, Yellow, dry 4th, 3×9	do.	10	10	0	—		
Do. Gefle, Yellow, Inf. 5th, 2½×7	do.	8	10	0	—		
Do. Ingramport, White, unsorted, 3×9	do.	7	5	0	—		
Do. do. do. do. 3×8	do.	7	5	0	—		
Do. do. do. do. 3×7	do.	7	5	0	—		
Do. Kola, Yellow, unsorted, 3×9	do.	10	15	0	11	0	0
Do. do. do. do. 3×8	do.	10	0	0	—		
Do. do. do. do. 3×7	do.	10	5	0	—		
Do. do. do. do 2½×8	do.	9	15	0	10	0	0
Do. do. do. do. 2½×7	do.	10	5	0	—		
Do. Kovda, Yellow, 2nd, 3×9	do.	15	5	0	—		
Do. Kagr, Yellow, unsorted, 3×3	do.	8	5	0	—		
Do. Mesane, Yellow, 3rd, 3×9	do.	10	10	0	—		
Do. Mobile, Rio Pitch Pine, 3×9	do.	8	10	0	8	15	0
Do. Ornskjoldsvik, Inf. yellow & white, 3×9	do.	5	10	0	5	15	0
Do. St. John, Spruce, 1st, 2nd & 3rd, 3×12	do.	9	5	0	—		
Do. St. Petersburg, White, 3rd, 3×9	do.	9	5	0	9	10	0
Do. Sornas, Yellow, unsorted, 2½×8	do.	8	15	0	—		
Do. do. do. do. 2½×7	do.	9	0	0	—		
Battens, Archangel, Yellow, 3rd, 2×11	do.	10	10	0	—		
Do. Gefle, Yellow, Inf., 5th, 2×8	do.	8	5	0	—		
Do. Mesane, Yellow, 3rd, 2×9	do.	11	5	0	11	10	0
Do. Porsgrund, White, unsorted, 2×4	do.	8	0	0	—		
Do. Storfors, White 1st & 2nd, 2×4	do.	8	15	0	—		
Do. do. Yellow, 2nd, 2×4½	do.	8	10	0	—		
Do. do. do. do. 2×4	do.	9	10	0	—		
Do. Sornas, White, unsorted, 2×4½	do.	7	15	0	—		
Do. Soderhamn, Yellow, 4th, 2×7	do.		10	0	9	15	0
Flooring Boards, Fredriksstad, Yellow & White, 1×7	do.	0	7	3	0	8	3
Do. do. do. 1×6½	do.	0	7	0	—		
Do. do. do. 1×6	do.	0	6	9	0	8	0
Do. do. do. 1×5	do.	0	6	3	0	6	6
Do. do., Yellow, 3rd, 1×5½	do.	0	9	0	—		
Do. do. do. do. 1×5	do.	0	9	0	—		
Do. do. Mixed Yellow, 1×5½	do.	0	9	3	—		
Do. Sandarne, Yellow, 2nd, 1×6½	do.	0	11	0	0	11	3
Do. do. do., 3rd, 1×6½	do.	0	10	3	—		
Do. do. White, 1st & 2nd, 1×6	do.	0	10	0	—		
Do. Sundswall, Yellow, 2nd, 1×6	do.	0	11	0	—		
Do. do. do. 3rd, 1×6	do.	0	10	3	—		

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Bristol.—Accepted for the erection of stabling at rear of 8, Royal York Crescent, Clifton, for his Honour Judge Ellicott. Mr. B. Wakefield, architect, 45, Nicholas Street, Bristol :—

W. D. Thomas, Clifton	£240

Hapton (Burnley).—For the kerbing, flagging, paving and making-up of a number of streets in the village of Hapton, for the Burnley R.D.C. Mr. S. Edmondson, surveyor, 18, Nicholas Street, Burnley :—

A. Hopkinson, Birmingham	£3,487
Exors. J. Broadley, Clayton-le-Moors	2,650
J. Edge & Co., Salford	2,497
W. Townsend, Colne	2,421
F. Penwarden, Colne	2,329
J. Bannister, Brierfield	2,204
T. Coates, Bacup	2,192
J. Miles, Burnley	2,180
W. Sutcliffe, Burnley	2,180
J. Wadge, Burnley	2,139
T. Brown, Accrington	2,130
Cooke & Flannery	2,092
J. Green,* Burnley	2,091

*Accepted.

London.—For the erection of a refreshment house and shelter at Avery Hill, for the London County Council :—

	£	s.	d.
R. Iles & Co., Walham Green	£3,525	10	0
Boulton & Paul, Ltd., 97, Queen Victoria Street, E.C.	1,469	0	0
H. J. Smith & Son, Maidstone	1,201	19	0
R. Harding & Son, Brixton ...	1,189	9	7
W. Pollock, Eltham	1,146	8	5
J. & C. Bowyer, Upper Norwood	1,112	0	0
T. J. Hawkins & Co., Westminster	1,112	0	0
Griggs & Son, Cubitt Town ...	1,072	10	0
W. Harbrow, Bermondsey ...	1,064	10	0
W. Roberts, Croydon	1,036	4	0
Thomas & Edge, Woolwich ...	999	0	0
W. F. Blay, Dartford	998	17	5
Frank Miskin, Ltd., Gravesend	991	1	1
J. Barker & Co., Ltd., Kensington	975	0	0
F. & G. Foster, Norwood Junction	948	0	0
T. Knight,* Sidcup	929	0	0
Loasby & Salmon, 224, Hither Green Lane, Lewisham ...	909	14	6

*Recommended for acceptance.

(Architect's estimate, £975.)

London, S.W.—For the erection of 20 five-roomed cottages, 16 four-roomed cottages, and 16 three-roomed cottages on the Norbury Estate, for the London County Council (section B) :—

Henry Lovatt, Ltd.	£16,277
Kirk & Randall	14,980
Chas. Wall, Ltd.	14,404
T. J. Hawkins & Co.	13,964
Gathercole Brothers	13,900
Holliday & Greenwood, Ltd.	13,735
Leslie & Co., Ltd.	13,619
J. Smith & Sons, Ltd.	13,544
F. & H. F. Higgs	13,448
F. & T. Thorne*	12,794

*Recommended for acceptance.

(Architect's estimate, £13,676.)

(All of London.)

Llansaint (near Ferryside, Carmarthen).—For the erection of a new council school for 120 scholars. Mr. William D. Jenkins, F.S.I., M.S.A., county education architect, Shire Hall, Carmarthen :—

	£	s.	d.
George Mercer, Llanelly ...	£2,595	0	0
David Jones, Carmarthen	1,789	0	0
Rees Davies, Carmarthen	1,750	0	0
Daniel Davies, Ffairfach, Llandilo	1,749	0	0
D. Howells & Son, St. Clears	1,729	9	0
Phillip Phillips,* Trimsaran ...	1,695	0	0

*Accepted.

(Architect's estimate, £1,700.)

Oswestry.—For the laying of mains in connection with the water supply of Whittington and Gobowen, for the Oswestry R.D.C. Messrs. Berrington, Son & Martin, engineers, 28, Victoria Street, Westminster, S.W., and Wolverhampton :—

	£	s.	d.
G. Williams & Son, Ellesmere	£4,040	4	4
J. Dean & Co., Llandudno ...	3,937	11	6
J. F. Tyler, Oswestry	3,729	9	8
H. V. Smith & Co., London ...	3,363	0	6
F. D. Clark, Newtown	3,311	0	0
H. E. Buckley, Bradford	3,190	0	0
J. Higgins, Oswestry	3,012	6	0
P. & S. Kearsley, Leigh	3,007	13	0
Jones & Evans, Oswestry	2,950	0	0
Davies Brothers, Wrexham ...	2,932	16	0
E. Tabor, Cambridge	2,914	19	6
H. Holloway, Wolverhampton...	2,914	0	0
J. Moffat, Ellesmere	2,906	18	1
W. H. Thomas, Oswestry	2,905	0	0
J. E. Morgan Jones, Oswestry	2,854	0	0
C. J. Nevitt, Ltd., Stafford ...	2,846	9	4
F. Mitchell & Son, Hulme ...	2,830	0	0
H. Ashley, Mansfield	2,785	0	0
R. C. Brebner & Co., Edinburgh	2,717	11	0
J. W. Dean, Ltd., London ...	2,702	19	4
H. A. Jones, Wrexham	2,678	17	3
W. H. Reading, Wolverhampton	2,675	0	0
J. Owens, Wolverhampton ...	2,659	0	0
R. C. Crawford, Uddingston ...	2,639	14	2
Jowett Brothers, Burscough ...	2,634	5	3
J. H. Macdonald, Edinburgh ...	2,615	0	0
G. Rutter & Sons, Washington Station	2,537	12	2
W. Westwood, Bromyard	2,531	11	8
G. H. York & Co.,* Wellington	2,498	13	2

*Accepted.

(Engineers' estimate, £2,700.)

ARCHITECTURAL DIS-ORDERS COMPETITION.

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The competition is divided into two parts—the first appealing mostly to students and practitioners of architecture and the second more especially to those practically engaged in constructional work. The most valuable prize will be given for the highest number of correct solutions of all the pictures in both divisions, but the rest of the prizes will be allocated to two classes, so that every reader will stand a fair chance of winning a prize—*i.e.*, there will be no privileged class.

As regards division A (architecture) we would call attention to the fact that a number of the questions will directly relate to the Orders of architecture, these being wrongly drawn in some way or other: and in solving these questions it will be found very useful to refer to the series of articles published recently in our columns under the title of "Practical Notes for Architectural Draughtsmen," by Messrs. Alfred W. S. Cross and Alan E. Munby, which series is being separately published as plates for use on the drawing-board.

The pictures in the "Architectural Dis-Orders Competition" will be published each week for 26 weeks in THE BUILDERS' JOURNAL, the first set having been given in last week's issue, February 6th.

Competitors may send in as many sets of solutions as they please, provided they are in accordance with the conditions.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, **6, Great New Street,** London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

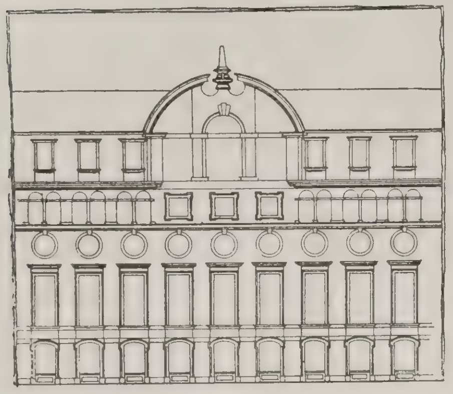
10. Any violation of these rules will entail disqualification.

11. The Editor's decision on every matter will be final.

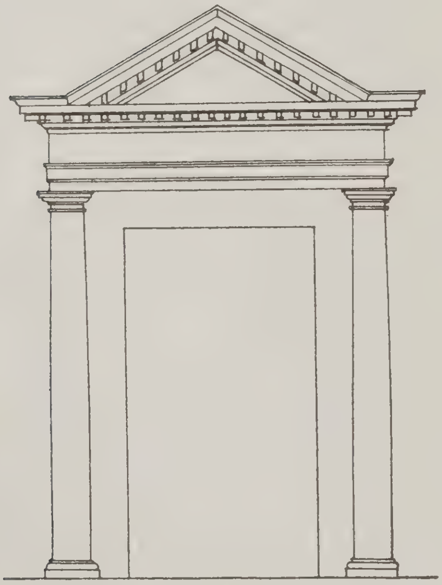
ARCHITECTURAL DIS-ORDERS COMPETITION.

(Second Series.)

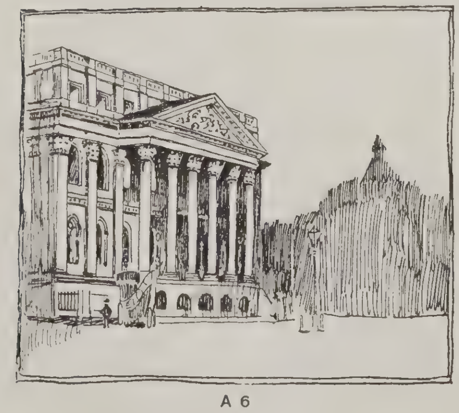
CLASS A (ARCHITECTURE).



A 4



A 5



A 6

THE PRIZES.

£20, and 50 other valuable prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions to the question "What is wrong?" in relation to each of the drawings published in the "Architectural Dis-Orders Competition." The winner, or winners, of this special prize will not be eligible for any of the other prizes offered.

The remainder of the prizes are divided into two classes, as follows :—

Class A (Architecture).

1st Prize.—£10.

2nd Prize.—Morocco leather pocket case of German silver instruments, comprising 5-in. sector-jointed compass, with double knee-joints, hair spring attached to the divider leg of compass, nut and bolt needle points, pen and pencil legs, lengthening bar, set of three spring bows, ruling pen.

3rd Prize.—Leather case of instruments, containing 4-in. German silver bow compass, hinged pen and pencil points, needle or lead holder, and handle to take pen or pencil leg.

4th Prize.—Leather case of beam compasses, with tangent screw adjustment, and needle points (electrum).

5th Prize.—Architect's pine drawing board, grooved, with mahogany battens, brass slots and screws to allow of contraction. One edge inlaid with ebony. Size 28ins. by 21ins.

6th Prize.—A morocco pocket case containing an English set of three spring bows, with steel heads and steel points (divider, pen and pencil).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case containing 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

9th Prize.—A brass proportional compass, 6-in., partly divided.

10th Prize.—A pocket divider, electrum.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

Class B (Building).

1st Prize.—£10.

2nd Prize.—Abney level in morocco case, with 5-in. rack and vernier.

3rd Prize.—Best English-made electrum *Napier* pocket compass.

4th Prize.—A drawing set, comprising drawing-board (size 23ins. by 16ins.), 24-in. T-square, 2 large set-squares, and set of instruments in rosewood case, comprising 4-in. brass divider, needle-pointed compass with pen and pencil points, bar, patent pencil point, slip rule, &c.

5th Prize.—A pair of builder's rods, spring-jointed.

6th Prize.—A pair of builder's rods (not jointed).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, contining 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, and 6-in. diagonal scale.

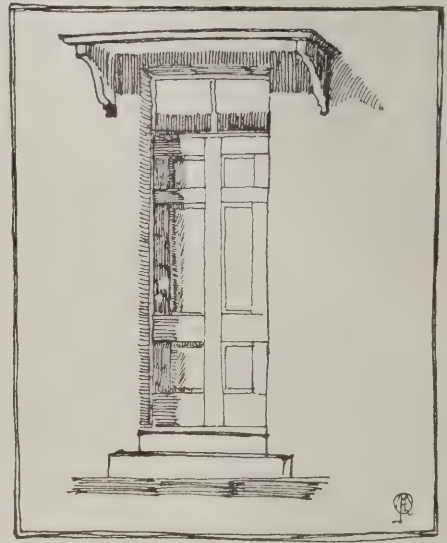
9th Prize.—Spirit level, 15ins., brass-faced.

10th Prize.—2-ft. fold-up boxwood rule, brass-jointed, fully divided, 4 bevels.

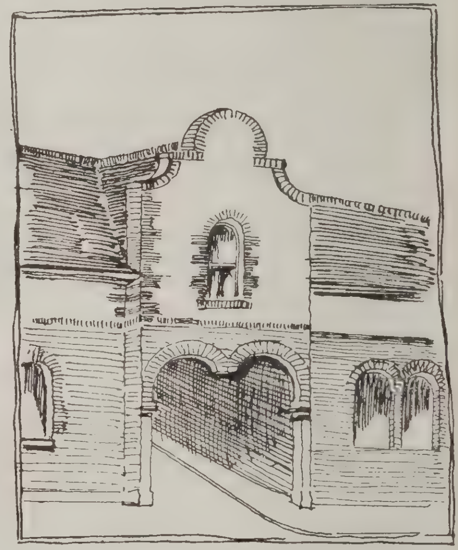
11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

(For Coupons see page VI.)

CLASS B (BUILDING).



B 4



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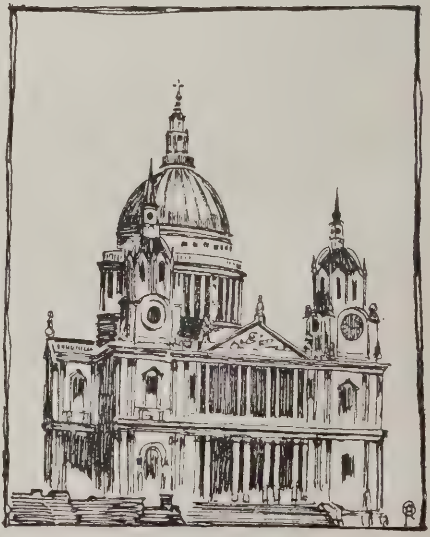

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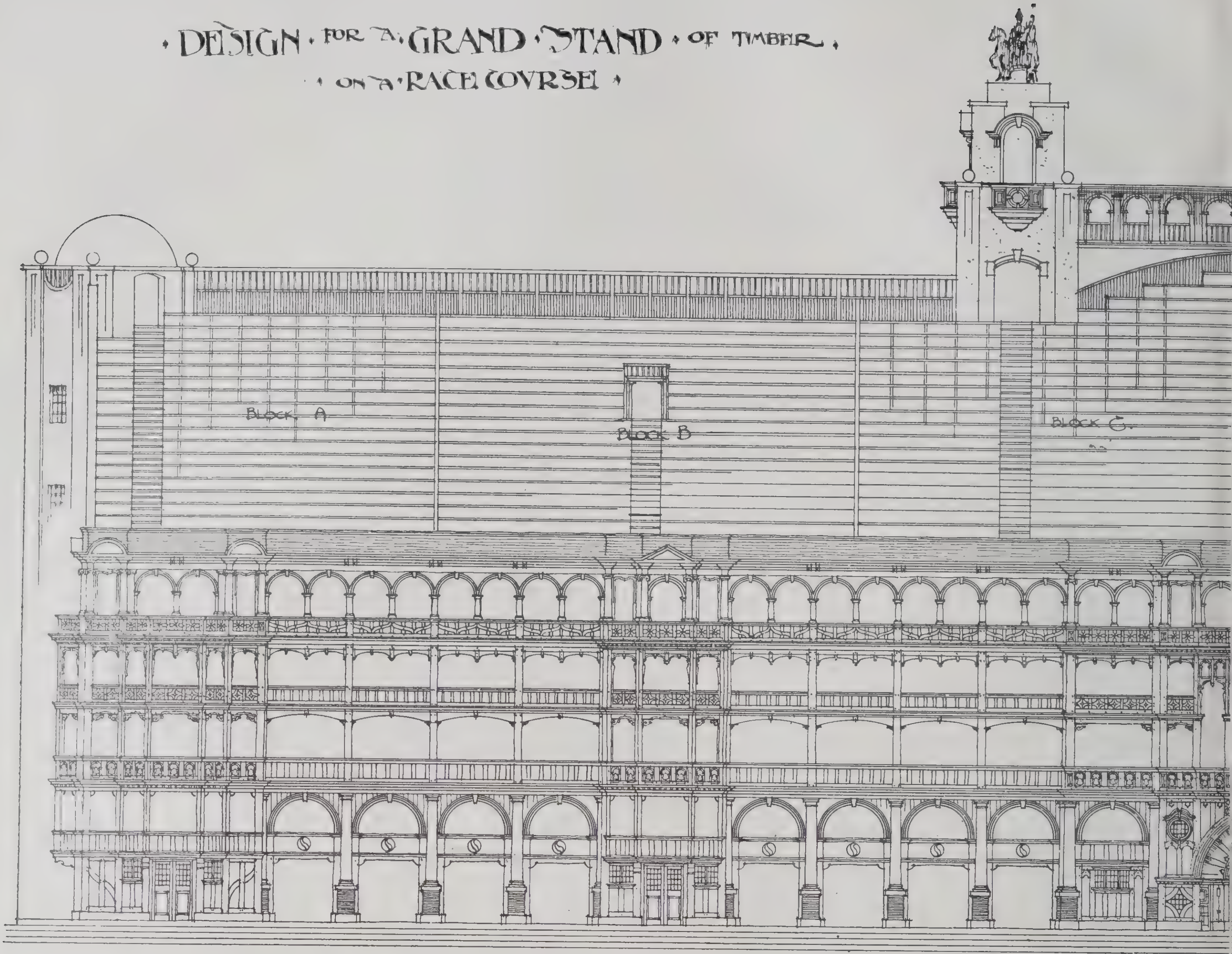
Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, February 20th, 1907.

· DESIGN · FOR A · GRAND · STAND · OF TIMBER ·
· ON A · RACE COURSE ·



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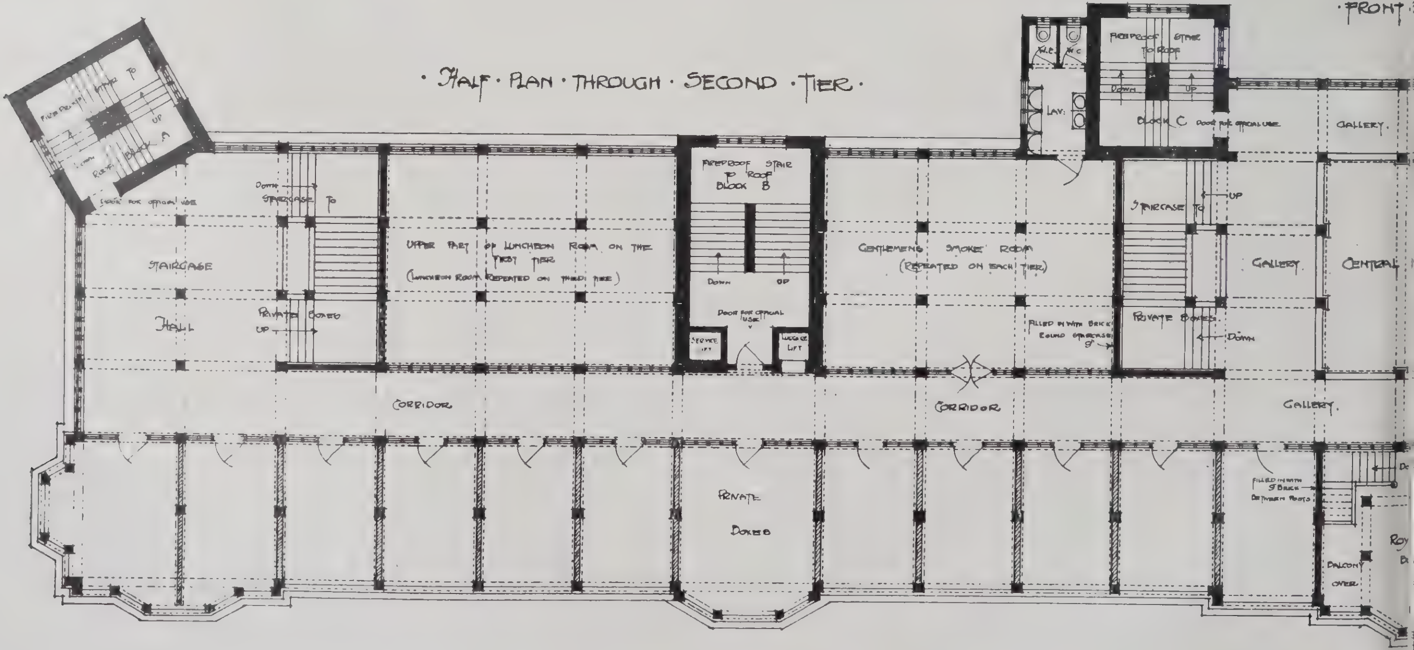

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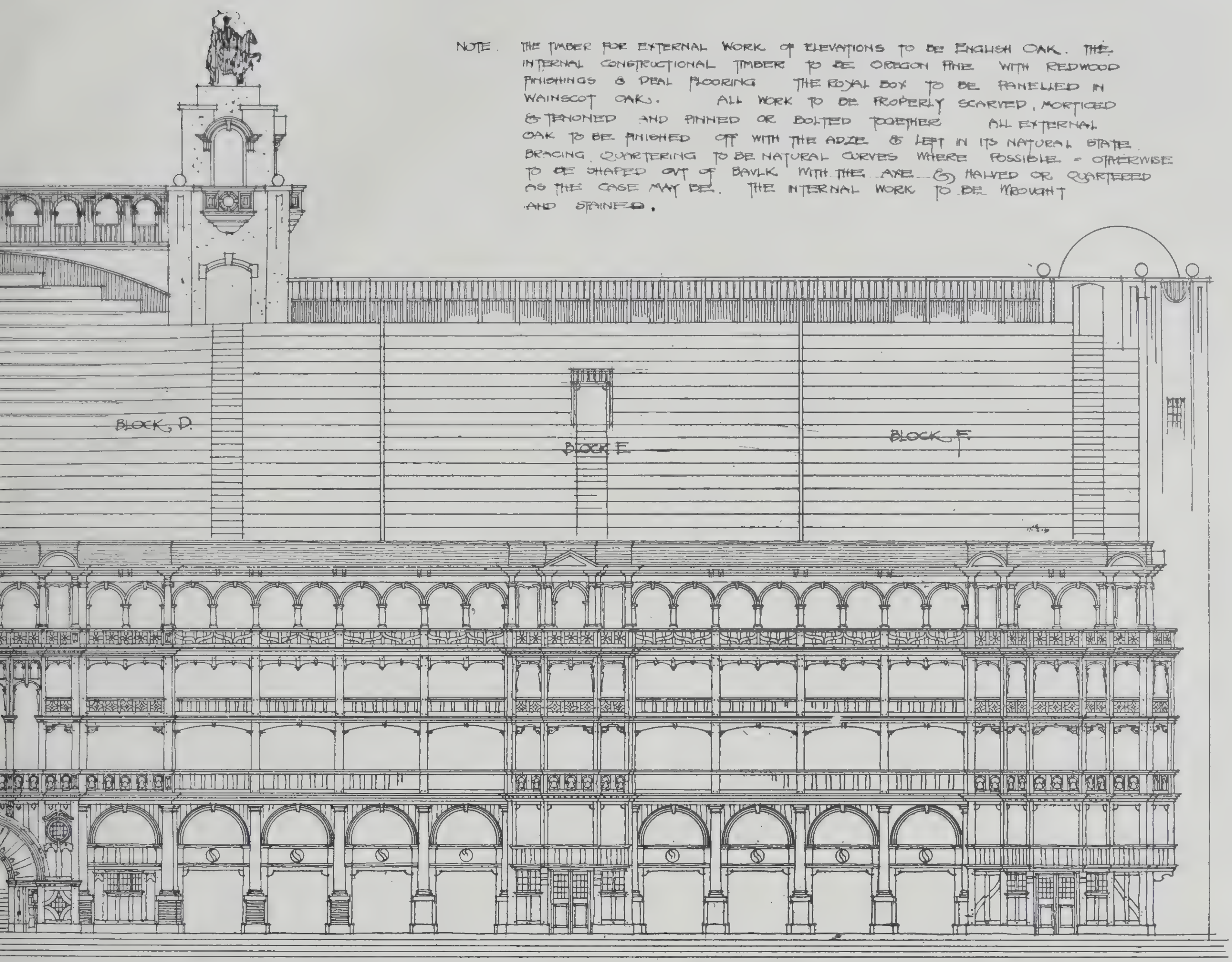

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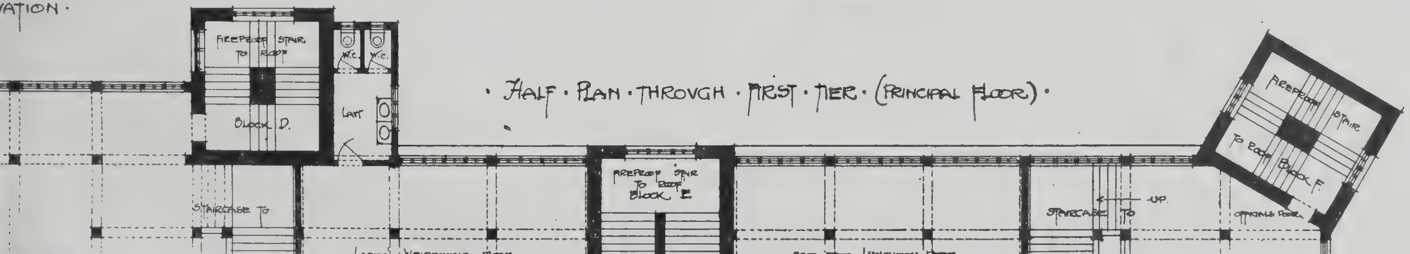

· HALF · PLAN · THROUGH · FIRST · TIER · (PRINCIPAL FLOOR) ·

BY W. A. MELLON.

LIBRARY
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February 20, 1907.

Volume 25, No. 628

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

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Complimetns at Washington. WITH our American exchanges now to hand, we are able to read in full the speeches delivered at Washington recently when Sir Aston Webb was presented with the first gold medal of the American Institute of Architects. We have not space to reprint he matter in our pages, but we think the occasion should not be passed over without a note on the very complimentary remarks which were made. The occasion was such hat one would naturally expect to find ompliments pretty freely expressed. Thus Mr. Frank Miles Day, the president of the American Institute, expressed their indebtdness to this country in the matter of rchitectural example, and said that just s they had received the traditions of nigo Jones and Sir Christopher Wren, traditions that gave vitality and character o their colonial building, so at a later time he classical revival that swept over Europe reached them directly from its English source; but President Day did not onfine his acknowledgment to the past. He had much to say for the present, and did not forget to mention Mr. Ernest George, Mr. Belcher, "the venerable Norman Shaw, whose laurels are still green," and Mr. Bodley, "whose perennial youth justifies him in Washington commencing even a cathedral," while, as for Sir Aston Webb himself, the president observed that on the score of amplitude his achievement lacked nothing, for no architect in England save Sir Christopher himself had been entrusted with the conduct of so many and such vast works. Replying to these remarks, Sir Aston Webb of course had compliments to pay to America, and so we find him referring to "the splendid architectural achievements" he had seen at Washington, Philadelphia and New York, and "the extraordinary ability" displayed by the Park Commission in the improvement scheme for Washington, while, in conclusion of his speech, came a veritable shower of eulogistic phrases, such as "your wonderful country," "your splendid architecture," and "your boundless generosity and hospitality." This is very pleasant reading for all of us.

School Planning. A REPORT of the Education Committee of the London County Council in reference to the planning of elementary schools should be taken note of by all architects concerned with this class of work. The Committee have had under special consideration the most economical and effective use of the accommodation provided, and the planning of the buildings to the greatest possible advantage from an educational standpoint. In the course of their deliberations they have been impressed by the fact that it is wasteful to provide, at a cost of about £20 per head, a large number of places in classrooms which, from an educational point of view, ought not to be—and, as a matter of fact, are not being—fully used. The summary of their deliberations is that, as a general rule in public elementary schools to be erected in future no classroom in the senior department should be planned to accommodate more than 40 scholars, and no classroom in the infants' department more than 48, except in particular cases where circumstances render a modification desirable. There can be no doubt that the crowding of too many scholars in one room is a great defect, as it leads to the perpetuation of the old fault associated with the handling of large and unwieldy classes in which the individual is lost in a crowd. Of recent years the tendency has been to build schools of one and two storeys, but as three-storey buildings have often to be provided it is interesting to note the statement which the Committee make as to cost of such buildings. Three types are cited—namely, (*a*) a school with 840 places, the estimated cost of the main building of which is put at £8,824, or £10 10s. 1d. per place; (*b*) a school with 968 places, the cost of which is put at £13,120 or £13 11s. per place; and (*c*) a school with 1,224 places, the cost of the main building of which is estimated at £15,128, or £12 7s. 2d. per place. The difference in cost between the above three estimates is due to the provision for two staircases in (*a*) and four in (*b*) and (*c*), necessitated by the requirements of the Board of Education.

New, True, or Neither

About those Norbury bricks. After the scenes in the L.C.C. chamber, when councillors and aldermen gravely produced brick after brick from their pockets to prove variously their perfections and their rottenness, nothing will be astonishing. It is to be regretted, however, that no controversialist adorned his tale by hurling his brick at an opponent. One lives in an atmosphere of disappointment and lost opportunities. But there are compensations. The halfpenny press has, in a brief week, learnt to talk the technicalities of brickmaking as to the manner born, and Fleet Street simply echoes with clunches.

* * *

When a fussy and impertinent individual once asked Dr. Creighton what Saint Paul would say if he could see an archbishop with a yearly income running into five figures, Dr. Creighton dryly replied that Saint Paul would doubtless think the Church had looked up since his time. Similarly, architecture has looked up since the days when William Adam, father of the Brothers Adam, examined in 1736 the Dundee Town Hall, then threatening to fall down, and made an extensive report. The Provost reported to the Council that "he had given Mr. Adam three guineas and spent with him some bottles of wine to the value of thirteen shillings and threepence sterling." One has heard of the Bodega type of architect who does his work on those tall stools which are not used exclusively in drawing offices, but life would be truly joyous if every report were considered in the rosy atmosphere occasioned by "some bottles." After Dundee, though, West Ham is justified of her children.

* * *

Of all the delightful aspects of Pepys' Diary there are none more valuable than those in which the gay Samuel delivers his soul as to matters artistic. He was admittedly more interested in drama than in the arts of building, but then there were no women architects in the seventeenth century, and on the stage there was his friend Mrs. Knipp. Nevertheless, he was something of an architect himself in a pleasant amateurish way. He was for ever tinkering at his own house, having new mantel-pieces, and doing all manner of structural alterations. The new flooring to his dining-room, done in 1663, vexed him not a little, though he took the keenest pleasure in "looking over the joiners." He spends an afternoon with his workmen "whose laziness do much trouble me." Disciples of the ca' canny system, no doubt.

* * *

It has been urged on many occasions by authorities on sanitation that in the interests of the public health vent pipes at the heads of drains should be available for ventilating the public sewer, and that the disconnecting trap now required by law to be fixed at the foot of drains should not be permitted. I understand that, if this principle is adopted and disconnecting traps are made illegal, all those builders who have in the past made it a rule always to remove the disconnecting trap after the drain has been passed by the authorities, will apply to the Institute of Sanitary Engineers for election as Honorary Fellows.

* * *

I can recall the distress of a builder whom I once met just after he had sustained the loss of a favourite disconnecting trap. The urban surveyor had waited to see the trench filled in after he had passed the drain. The luckless builder, who (as he told me) had used the trap for every house in the road, could not afford to dig down 9ft. for it, and accordingly had to bear the loss.

* * *

It is such misfortunes as these which, when we hear of them, help us to realise the hardship to the builder of the contract system. In the case noticed in the last paragraph, the builder could not possibly have foreseen, when he priced out his tender, that the surveyor would wait to see the trench completely filled in, and thus the man found himself out of pocket by the cost of the trap, and for no fault of his own.

* * *

The cause of architectural truth is being betrayed by the Piccadilly Hotel now approaching proud achievement in our midst. In place of the honest steel girders stiffened with plate glass, and supported by goodly stanchions cased in mirrors (to which we are accustomed in our London streets), I am shocked by attenuated stone piers at the apparent critical verge of rupture, and heavy arches of masonry painfully lacking adequate abutment. I knew that in this building Shop was to be sacrificed to the cause of Architecture, and it now appears that Architecture is also to be sacrificed to the cause of Shop.

* * *

An eminent architect, now dead, owed his phenomenal success, as I am informed, to a notable act of generosity and forbearance at the outset of his career. A tower he was building unfortunately fell down when the scaffolding was removed. He at once sent a graceful message to the owner, informing him that he would supply a new design without charging any extra fees. His magnanimity was not forgotten by his grateful client, and his fortune was made.

* * *

A speaker at the Architectural Association lately stated that American architects are frequently required to make designs and supply working plans at two or three days' notice. Perhaps this explains the practice, common in America, of taking down buildings ten or fifteen years after they are erected.

THE LOOKER-ON.

NOTES FOR ARCHITECTURAL DRAUGHTSMEN.

By Alfred W. S. Cross, M.A., F.R.I.B.A. and Alan E. Munby, M.A.

PART II.

(Continued from p. 61, No. 626.)

Gothic Tracery.

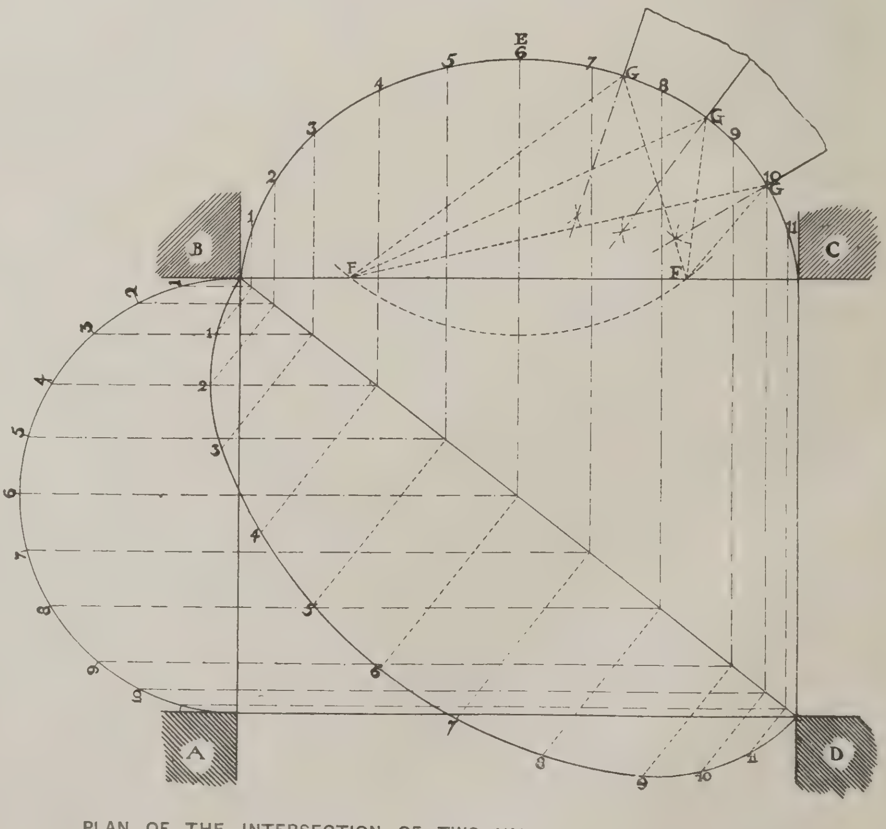
FIGS. VI. and VII. show two examples of tracery taken from Brandon's "Analysis of Gothic Architecture." The horizontal line giving the lower limit of the tracery is first drawn and the centres for striking the arch (which will depend generally upon the span and the height to be dealt with) are next decided upon. The tracery is worked from the fillet line, the form of which may show infinite variety according to the design, but must always be continuous throughout. The best method to adopt is to take the centre of the fillet and work out the geometrical pattern of the windows, as shown upon the right of each of the figures, as it is easier to see whether these lines really "come up" correctly at points of contact than is the case if the actual fillet is first set out. Having entirely completed this centre line, the width of the fillet is marked off on either side and drawn in. In filling in the spaces formed by the fillet it is first necessary to decide upon the total projection of the tracery beyond the fillet which at points of similar contour is maintained throughout. Centres for the cusping are now decided upon, and in arranging them the inner line of the tracery should be first drawn, as it will thus be seen whether the curves proposed will admit of the introduction of a suitable cusp. No general rules can be given either for forming the cusps or for obtaining the centres; the contour of the curves on either side of a cusp are, however, generally similar, or approximately similar, in form.

Vaulting.

FIG. VIII.—The conditions to be complied with in constructing vaults present many variations, which make it impossible to deal with the subject exhaustively without a lengthy discussion aided by numerous examples. In Roman vaulting, as here illustrated, the shape of the vaulting surfaces, which are entirely constructional, are decided upon, the groins formed by the intersection of the cross vaults following as a matter of necessity. In Gothic vaulting, on the other hand, the ribs including the diagonal ribs, which form the contour of the groin lines, are designed independently, and the vaulting surface merely forms a filling between them, supporting nothing but itself and having no necessary continuity of form. The levels of the springings of the different arches, the heights of their crowns and the curvature they are to assume, are the three factors upon the relationship of which the setting-out of the vault generally depends, the spaces to be covered being usually fixed by circumstances.

Turning to Roman vaulting, in ordinary cases all the arches spring from the same level and have the same height at the crowns. If the spans of the main and cross vault are the same this presents no difficulty, the vault being symmetrical and the curvature of both vaults the same. Such vaults will usually be semicircular in form and their groin line will form a semi-ellipse in elevation. The figure shows a plan of the intersection of two vaults AB and BC, the spans of which are different. Let it be decided that the covering of AB is to be semi-circular, and that the springings of both vaults are to be at the same level and their crowns at

FIG 8



PLAN OF THE INTERSECTION OF TWO VAULTS OF DIFFERING SPANS.

the same height, as would be usually the case in practice. Draw the elevation of the vault AB as shown on the left side of the figure, and a diagonal line BD which represents the line of the groin on plan. Mark off any number of points and draw ordinates 1, 2, 3, &c., from the line AB to touch the semi-circle, and continue them to cut the diagonal BD. Now project from these points of intersection a series of lines, cutting BC at right angles, and mark off upon each, measured from BC, a length equal to the corresponding ordinate from the line AB to the semi-circle, the ordinates in each case being measured from the springings of the two arches. A curve traced through these points gives a semi-ellipse, which forms an elevation of the larger vault.

If the groin line is required, repeat the operation of the setting-up of ordinates (of equal length to those obtained either from AB or BC) from the points of intersection on the diagonal BD and draw the curve, terminating in B and D, shown below the diagonal line.

FIG 7

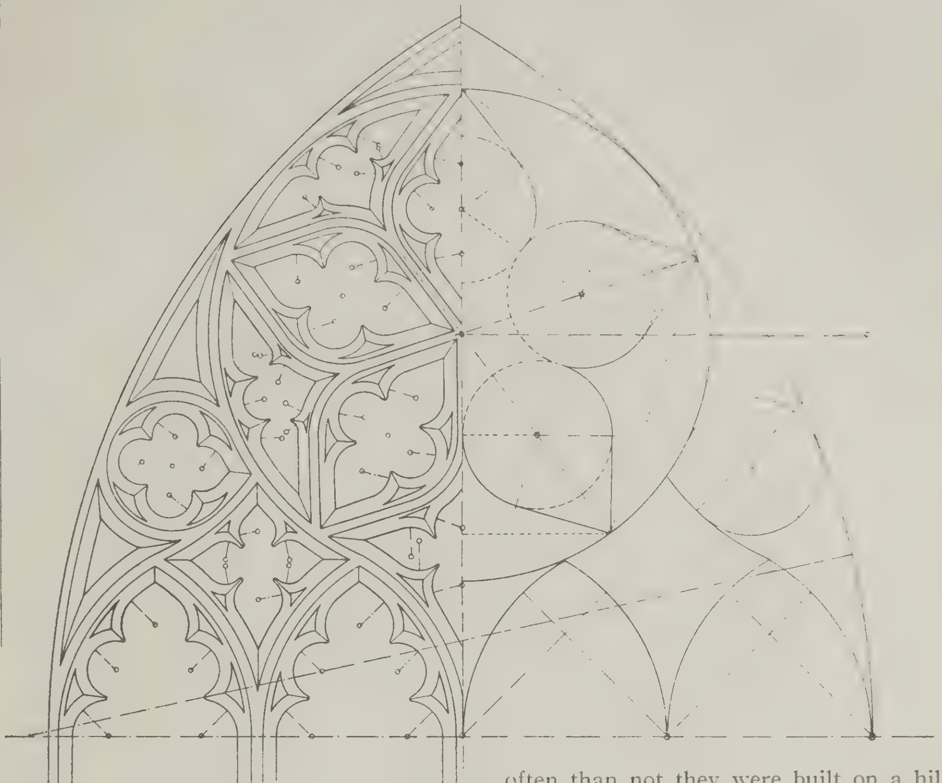
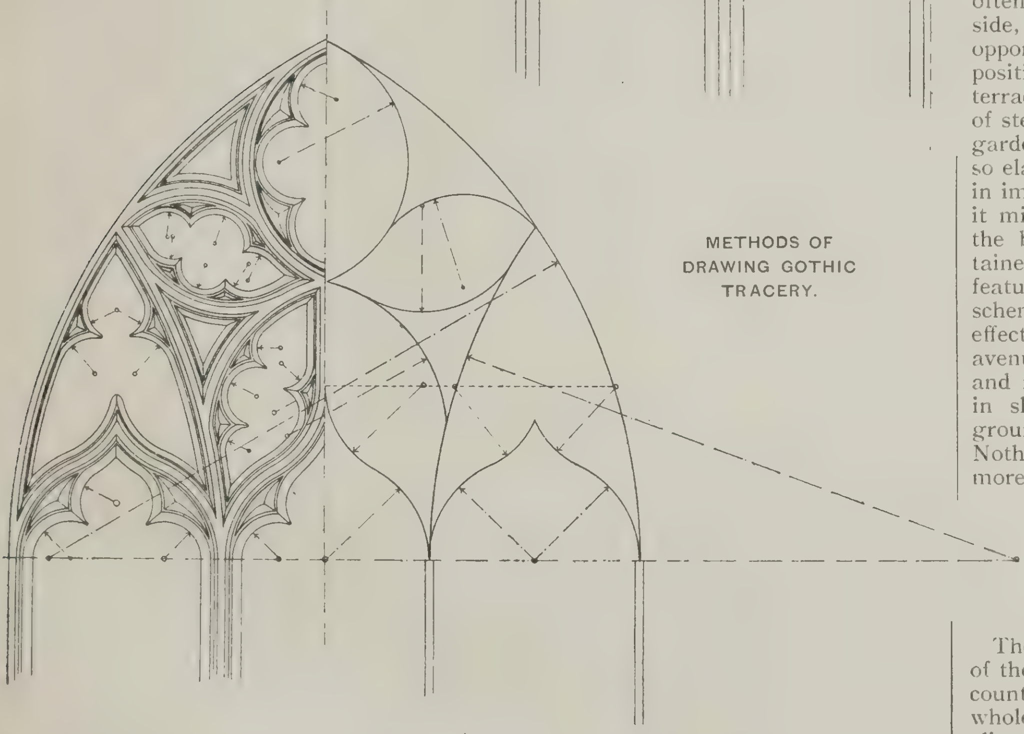


FIG 6



METHODS OF DRAWING GOTHIC TRACERY.

The method of setting-out the joint lines for an elliptical arch is shown on the elevation of the vault BC. With the crown of the arch E as centre and half the span as radius, describe an arc FF. Divide the soffit of the arch into any number of parts, depending upon the length of the stones to be used, join each of these points, as GGG, to the points FF and bisect the angles FGF. These bisectors continued give the proper joint lines for the stones.

[NOTE.—For further practical information on masonry and stone cutting the reader is referred to the excellent manual on the subject by Mr. William R. Purchase, published a few years ago. This contains much valuable information, and has offered one or two suggestions to the present writers.]

(To be continued.)

VILLAS AND GARDENS OF ITALY.

At the last meeting of the Leeds and Yorkshire Architectural Society Mr. W. H. Thorp, F.R.I.B.A., read a paper on "The Villas and Gardens of Rome, Tivoli and Frascati." The lecturer drew a comparison between an ancient country house of a Roman patrician of the time of the Cæsars and the sumptuous villas erected by the wealthy cardinals in the sixteenth and seventeenth centuries in the vicinity of Rome, more especially those to be found in the favourite resorts of Tivoli and Frascati. Before describing any villa in particular, Mr. Thorp said it might be well to take note of the general characteristics of Italian villas as a class. More often than not they were built on a hillside, and this afforded the architect an opportunity to place his house in a fine position for effect, and to so arrange his terraces, avenues and balustraded flights of steps as to enhance its attractions: the garden setting, in fact, was sometimes so elaborate in its devising that it outvied in importance the villa itself. Strange as it might appear, the cult of flowers and the brilliant effects of colour to be obtained thereby did not form an important feature in the Italian garden decorative scheme. Other means were relied on for effect. Benches of marble bordered the avenues at intervals, and statues, vases and relics of antique sculpture stood out in sharp relief from the sombre background of cyprus and evergreen oak. Nothing probably impressed the visitor more than the variety imparted to the gardens by the introduction of water in the form of cascades and fountains. In many cases the hydraulic engineer was a man of renown, or ranked in importance equal with the architect.

The term "villa" in the Italian sense of the word was not applied merely to the country house itself, but included the whole of the estate, with its vineyards, olive plantations, and gardens. The country-house, or Italian "maison de plaisance," did not, as a rule, comprise the extensive suites of apartments considered necessary for the nobleman's town house. As befitted its situation in the suburbs or country, an airy and cheerful aspect was desired, and secured by means of loggias, open arcades and lofty rooms, with balconies giving upon the landscape.

The lecturer described in detail the Villa Medici and Villa Borghese in Rome, Villa d'Este in Tivoli, and Villa Aldobrandini, Villa Falconieri, Villa Mondragone, and Villa Torlonia in Frascati, illustrating his remarks with lantern slides.

PLYMOUTH LIBRARY, MUSEUM AND ART GALLERY.

The accompanying illustrations show the first-premiated design in the recent competition for the proposed library, museum and art gallery at Plymouth, which competition was limited to local architects. A description of the building was given on p. 62 of our issue for February 6th. The total cost of the scheme is estimated at £25,000—£13,000 for the library and £12,000 for the museum and art gallery. The successful architects are Messrs. Thornely and Rooke, of Plymouth.

Notes on Competitions

London County Hall.

With regard to the date for receiving designs for the new county hall in the preliminary stage of the competition, it is anticipated that the conditions, plans, &c., will be all ready for issue to intending competitors by Wednesday next, February 27th. The advertisement announcing the competition will appear in the "Times" of that date, in the issue immediately prior to that date of certain English technical papers, and as early as practicable in the foreign technical papers, so as to enable the applications of intending competitors from the Continent to be dealt with by the time the particulars are ready. Taking February 27th as the date when the competition is publicly announced, the designs for the first stage should be delivered six months later—that is, by August 27th next.

Salford Royal Hospital Extension.

This competition has been decided in favour of Mr. John Ely, F.R.I.B.A., of Manchester. Eight architects were invited to compete, and their designs were assessed by Mr. Keith D. Young. F.R.I.B.A. The extension is likely to cost £70,000.

School, Southport.

"Support home industries" enjoyed a long run at last week's discussion of the Southport Education Committee's decision to open the competition for the new school to the architects of all Lancashire. The Southport Architectural Society had sought to restrict the competition to architects practising in Southport, and several speakers were in favour of this, one speaker's conclusion being that the committee wanted "an ordinary garden variety architect."

Carnegie Library, Dunfermline.

The following is the assessor's award in the competition for the branch library and reading-room to be erected in the Baldridgeburn district by the Carnegie Dunfermline Trustees:—1st (£20), Mr. Hippolyte J. Blanc, Edinburgh; 2nd (£15), Mr. J. Cumming Wynnes, Edinburgh; 3rd (£10), the late Mr. Andrew Muirhead, Dunfermline. The Trustees, however, have selected the design of Messrs. H. & D. Barclay, of Glasgow. The estimated cost of the building is £5,000. Nearly 100 designs were submitted in competition. Mr. George Wilson, of the firm of Messrs. Mitchell & Wilson, architects, of Edinburgh, was the assessor.

New Technical Institute, Dundee.

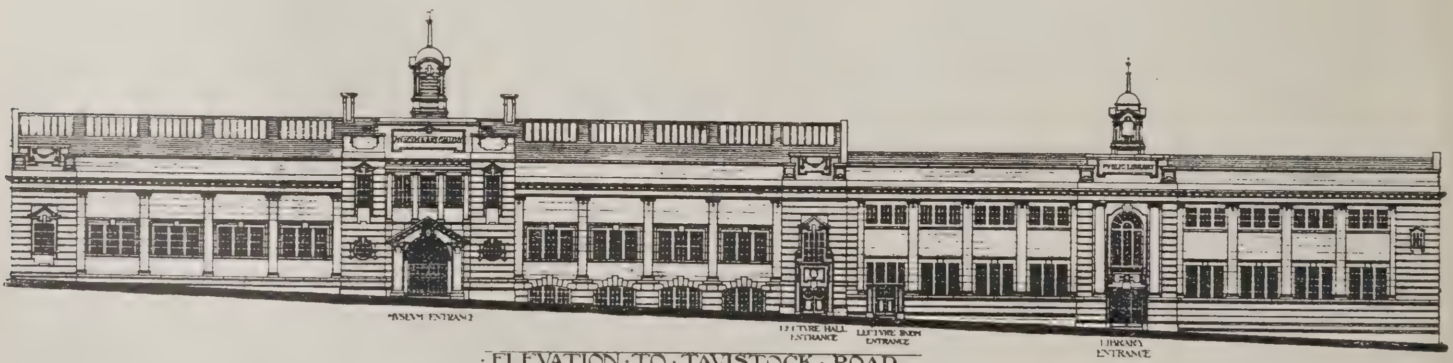
As announced in our issue for last week, a competition is to be held for the frontage of the new technical institute at Dundee, of which plans for everything except the block of buildings facing Bell Street have been prepared by Mr. Robert Gibson, of Dundee—in one place described as "an architect" and in another as "a civil engineer." The Dundee Institute of Architects are making a protest against the conditions of the competition. In particular they object to the suggested commission of 4 per cent. instead of the customary 5 per cent. They also object to the selection being made by the Technical Institute Committee without an assessor. Four premiums, each of £25, are offered for the four designs which the committee consider to be the best in order of merit.

List of Competitions Open.

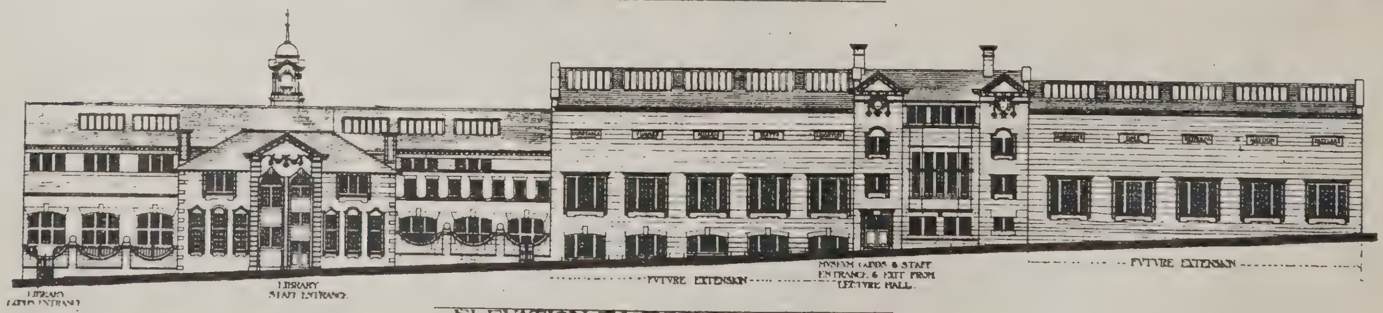
Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
Feb.	20	CHURCH AT LIVERPOOL.—To cost £7,500. Limited to architects in Lancashire. Particulars from Rev. G. Peters, 71, Hope Street, Liverpool.
Feb.	26	CHURCH HALL, STOCKTON-ON-TEES.—To cost £1,500. Particulars from A. Livingstone, 24, Russell Street, Stockton-on-Tees.
March	1	SMALL HOLDINGS, ROSSALL (Houses actually built).—Prizes of £100, £50, and £25. Applications for plots by this date. Particulars from Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
March	3	SECONDARY SCHOOL AT CASTLEFORD.—Limited to architects practising in the West Riding. Premiums £50 and £25. Assessor, Walter H. Brierley. Particulars from Alfred Wilson, clerk to Governors, Station Road, Castleford. Yorks. Deposit 10s. 6d.
March	15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham. Summary in "Builders' Journal," January 16th.
March	30	PRESBYTERIAN CHURCH AT ROKER, SUNDERLAND.—Premiums of £25 and £15. Particulars from George W. Bain, 46, John Street, Sunderland. Summary in this issue.
June	1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug.	27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars after Wednesday next (see note on this page) from the Clerk, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.

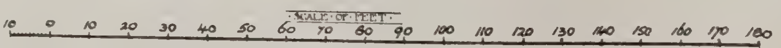
"Mr. Macartney's Paper on Regent Street."—In connection with the report of this paper in our issue for last week, we regret to find that the illustration of Mr. Norman Shaw's design for the rebuilding of the Quadrant was inadvertently used without acknowledgment to our contemporary "The Builder," in which the reproduction originally appeared.



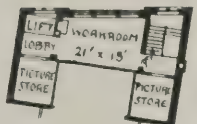
·ELEVATION·TO·TAVISTOCK·ROAD·



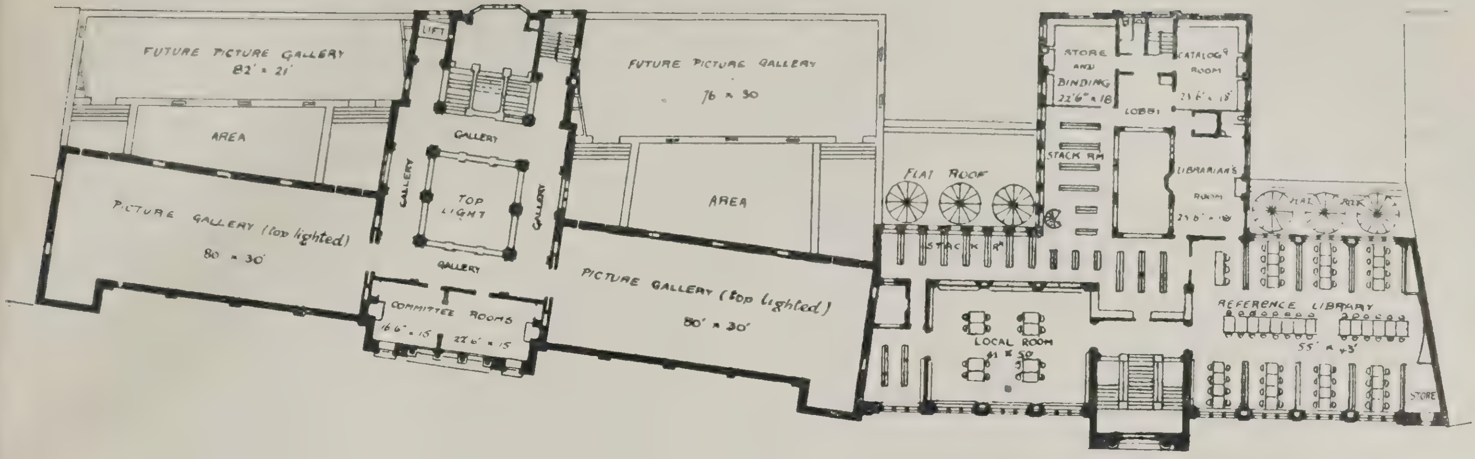
·ELEVATION·TO·TAVISTOCK·PLACE·



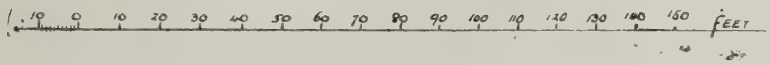
LIBRARY, MUSEUM AND ART GALLERY, PLYMOUTH: FIRST-PREMIATED DESIGN. THORNELY AND ROOKE, ARCHITECTS.

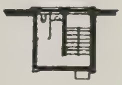


Upper First-Floor Plan, over Staircase, &c.

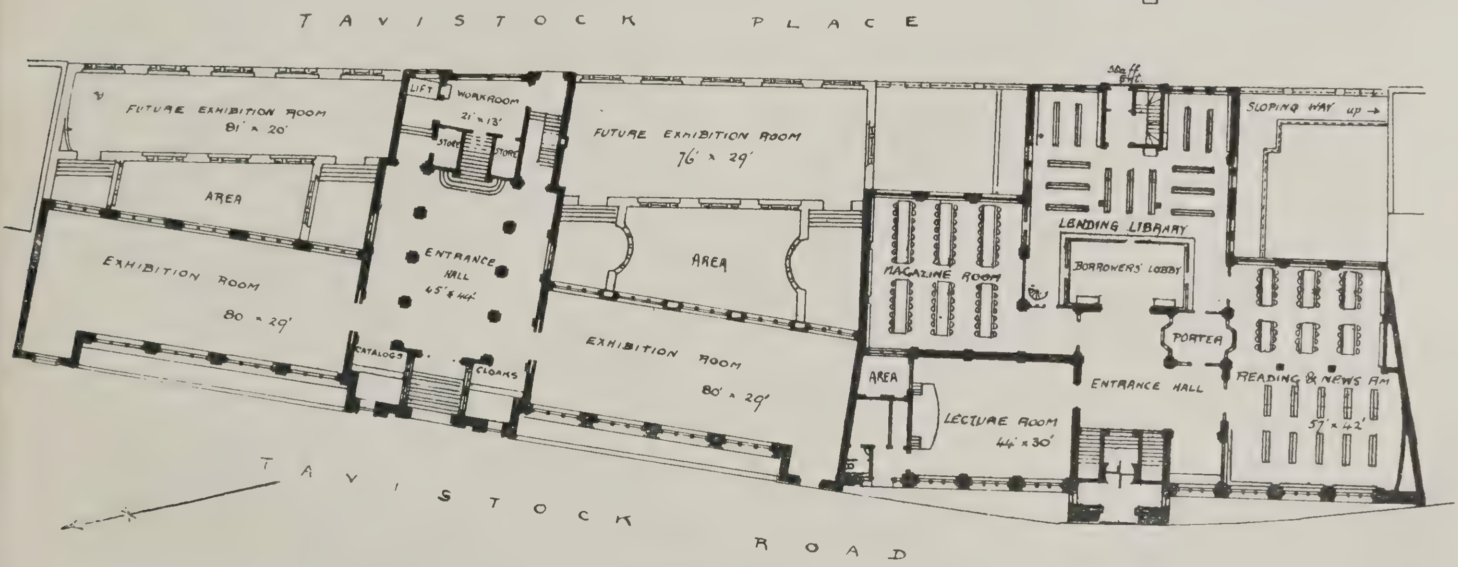

FUTURE PICTURE GALLERY 82' x 21'
AREA
PICTURE GALLERY (top lighted) 80 x 30'
LIFT
GALLERY
TOP LIGHT
GALLERY
COMMITTEE ROOMS 16'6" x 15 27'6" x 15
FUTURE PICTURE GALLERY 76 x 30
AREA
PICTURE GALLERY (top lighted) 80' x 30'
FLAT ROOF
STACK RM
LOCAL ROOM 41 x 30
STORE AND BINDING 22'6" x 18
CATALOGUE ROOM 23'6" x 18
LOBBY
STACK RM
LIBRARIAN'S ROOM 23'6" x 18
FLAT ROOF
REFERENCE LIBRARY 55' x 43'
STORE

First-Floor Plan.

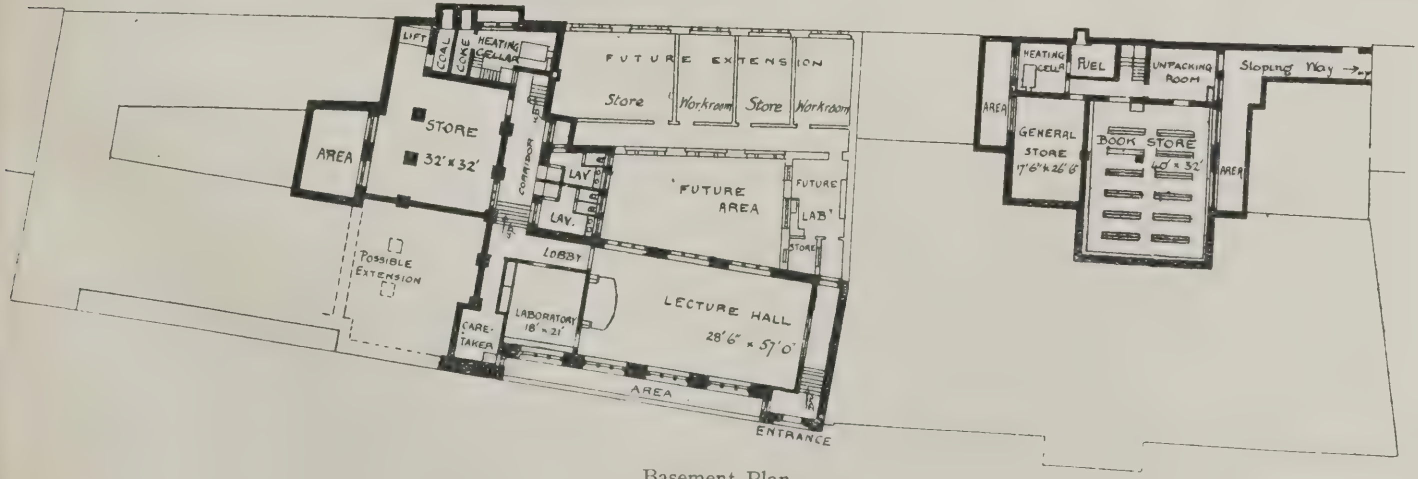

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 FEET



Mezzanine Plan, over Staff Entrance.

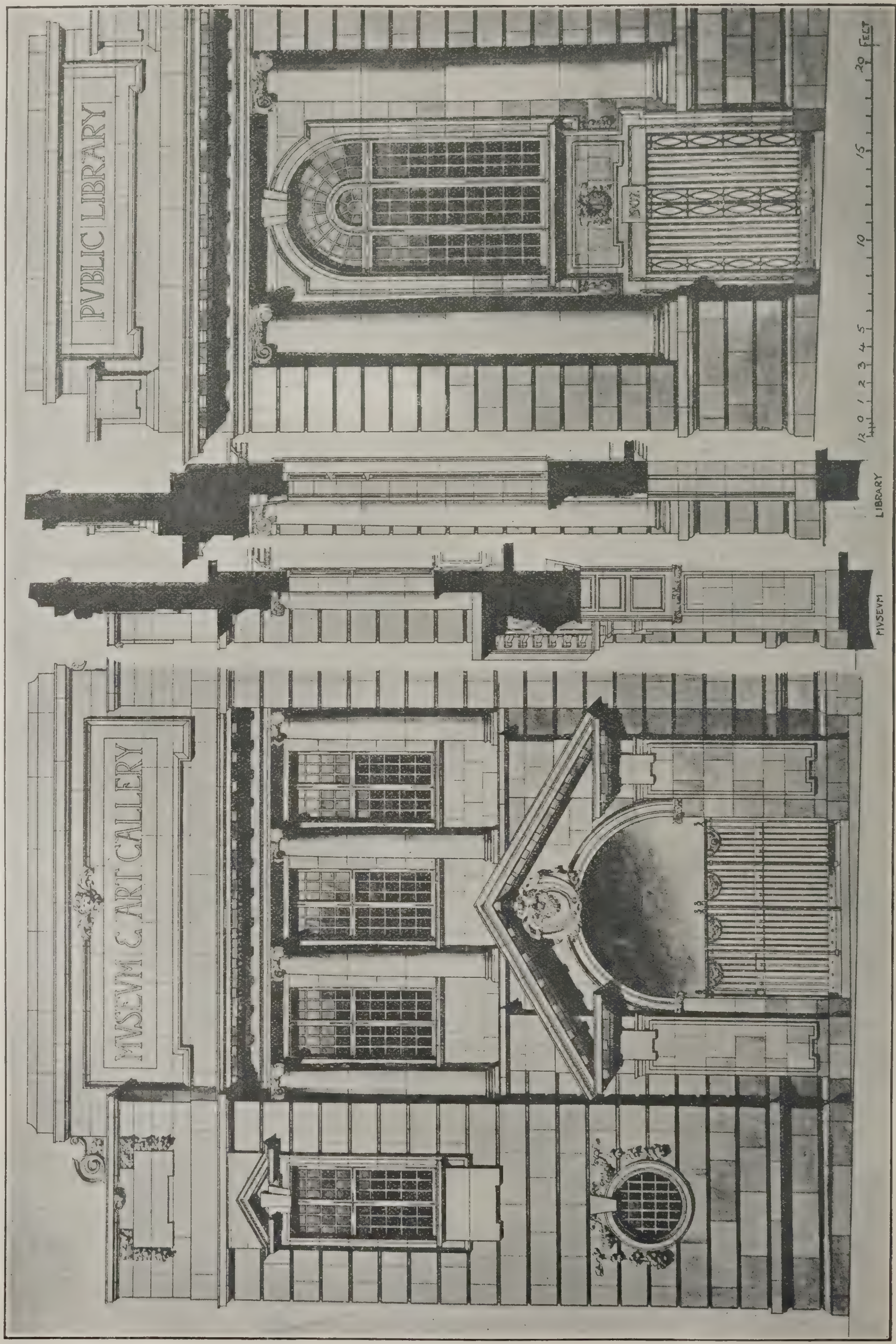


Ground-Floor Plan.



Basement Plan.

LIBRARY, MUSEUM AND ART GALLERY, PLYMOUTH. FIRST-PREMIATED DESIGN. THORNELY AND ROOKE, ARCHITECTS.



LIBRARY, MUSEUM AND ART GALLERY, PLYMOUTH: MAIN ENTRANCES. FIRST-PREMIATED DESIGN. THORNELY AND ROOKE, ARCHITECTS.

Our Plates

Grissell Gold Medal Design, 1907.

There is no need for any extended description of Mr. W. A. Mellon's Grissell Gold Medal design for a timber grand stand on a racecourse, as the drawings are themselves sufficiently explanatory; moreover, particulars of the construction are also given on them. We may add, however, that the stand is intended to accommodate 1,000 people in the boxes and 3,000 people on the roof. It was a requirement that the framing of the roof should be open to periodical examination, while ample means of access to the seats were to be provided.

ROKER PRESBYTERIAN CHURCH COMPETITION.

Summary of Conditions.

The following is a summary of the conditions of the competition for the proposed English Presbyterian Church (with halls, classrooms, &c.) at Side Cliff Road, Roker, Sunderland:—

Accommodation.—Church to seat 550 people, with vestry, two small halls or classrooms, and the necessary lavatory accommodation: this to form the first part of the scheme and to cost not more than £4,000 (inclusive). The designs are also to show a hall accommodating 250 people, infants' classroom seating 100 children, parlour with seating accommodation for 60 adults, and a number of small classrooms with lavatory accommodation: this to form the second part of the scheme, to be built later, and to cost not more than £2,000 (inclusive).

Elevations.—To be carried out in brick, with stone dressings. Style optional.

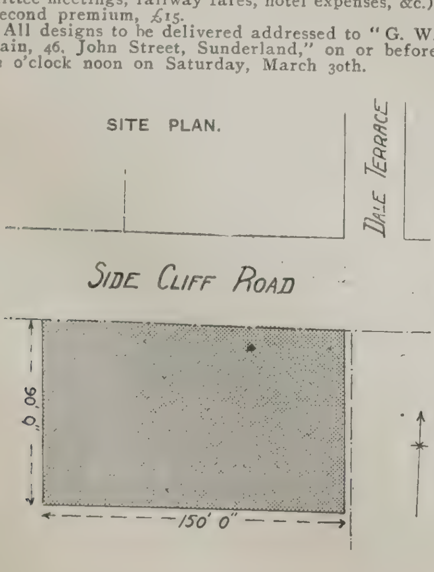
Drawings.—To be made to ⅛th scale, mounted on strainers. Number and character not specifically stated. All drawings to be in ink, with no colour introduced. Perspectives may be submitted if desired. Designs to be accompanied by written description, specification and estimate of cost.

Assessor.—Clause 20 states that "the Committee will appoint some architect, not being a competitor, to adjudicate the merits of the various designs submitted."

Rejection of designs.—In clause 14 the Committee reserve the right to reject any design "if, upon the quantities being taken out by a surveyor or surveyors appointed by them, the tenders based upon such quantities should exceed the original estimate submitted by the competing architect." Under clause 21 the Committee also hold themselves at liberty to reject the whole, or any, of the designs "if they should appear to be unsuitable, or of too expensive a character. If it should be found on opening the tenders for the execution of the work that the works cannot be completed for the amount stated in the architect's estimate by contractors satisfactory to the Committee, the Committee may, if they think fit, select another design, and proceed with it as though it had not been the design first selected, or decline to proceed with any of the designs, and in that case the architect whose design shall have been selected as the best shall not be entitled to the execution of the work, nor shall he have any claim upon the Committee for premium or in any respect whatever in connection with the matter."

Premiums.—For the first-premiated design—£25, to merge into commission (5 per cent., including all drawings, copies, specifications, estimates, superintendance, attendance on work and at Committee meetings, railway fares, hotel expenses, &c.). Second premium, £15.

All designs to be delivered addressed to "G. W. Bain, 46, John Street, Sunderland," on or before 12 o'clock noon on Saturday, March 30th.



Correspondence.

Skylights.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—I notice on page 63 of your issue of February 6th a reply to an enquiry about skylights. In reference to this I should like to say that I have used many skylights and have never had any trouble with leakage: this is entirely due to bad design and bad workmanship. Skylights are common on board all steamships (where they have to withstand rougher weather than in a house), and shipwrights are successful where architects have failed. It is true that skylights lose more heat per ft. super. as compared with windows, but against this has to be set the gain in cost, because they can be made from one-quarter to one-tenth the area of windows. I have here a skylight in a bathroom 6ft. by 6ft. by 8ft. high, and I find a clear light of 1ft. super of glass ample for it. A window would need to be about 4ft. 6ins. by 2ft. 3ins. overall.—Yours truly, X.

HAWKHURST.

Notes and News

A Dental Hospital is to be built in Oxford Street, Manchester, near the Victoria University. Messrs. Charles Heathcote & Sons are the architects.

District Surveyors' Association (Incorporated).—At the annual general meeting held on February 7th Mr. Frederick Warren was elected president, Mr. Henry Lovegrove vice-president, Mr. John Clarkson honorary treasurer, and Mr. Bernard Dicksee honorary secretary.

Holyrood Restoration.—The questions arising out of the proposed restoration of the Chapel Royal at Holyrood were discussed at last week's meeting of the Edinburgh Architectural Association, and it was eventually agreed to remit the matter to the Council to ascertain the exact facts of the case, and to report in due course.

Dissolution of Partnership.—The partnership hitherto existing between Messrs. Walter Veitch and H. E. Smith, carrying on business as the Tayler Smith Electric Co., has been dissolved as from August 31st last. The successors to the firm are Messrs. Veitch & Fenn (Mr. Walter Veitch and Mr. Amor Fenn): offices, 53, South Molton Street, London, E.C., and 28, South Anne Street, Dublin.

Dustless Roads: A National Experiment.—The National Dustless Roads Committee intends to arrange for a national experiment on one at least of the main roads leading out of London, on which about a dozen different dustless materials will be laid in sections from four to eight miles long, so that the relative durability can be compared and their other qualities ascertained over a long period, probably seven years.

Cost of the Bradford City Architect's Department. — From a statement just issued it appears that the average annual cost of the Bradford City Architect's Department during the past five years ended March, 1906, has been £1,630, compared with which the annual value of services (calculated on the R.I.B.A. schedule) on works actually carried out would have been £2,196, and on works not yet carried out £1,007—a total of £3,203, leaving a balance of £1,573 in favour of the Department.

QUANTITIES.

Memorandum by the Surveyors' Institution.

The following memorandum in regard to the employment of surveyors for the preparation of bills of quantities has just been issued by the Council of the Surveyors' Institution for the consideration of local authorities and public bodies:—

In view of the extension of the practice of direct appointment of surveyors by public bodies in connection with the preparation of bills of quantities and of variation accounts for works executed under their control, the council of the Institution have thought it advisable to draw up a memorandum relating to the funcions of a surveyor in this connection, and his relationship to the employer, the architect or engineer, and the contractor. In doing so they are influenced by the fact that the surveyor frequently does not come into direct contact with the public bodies employing him, and that the nature of his duties is, to the public mind, comewhat obscure.

The Surveyors' Institution is recognised as the highest authority of the profession, and the council therefore make no apology for drawing the attention of public bodies and others to the nature of the duties and responsibilities resting upon surveyors who practise in this branch of the profession; more particularly as those unfamiliar with its technicalities cannot appreciate the fiduciary nature of the position these surveyors are called upon to fill. Indeed, the employer, the architect, and the contractor, are so largely dependent upon their experience, accuracy and integrity, that it would be impossible to emphasise unduly the necessity for exercising special care and judgment in selecting a surveyor to prepare bills of quantities.

The council note with satisfaction the recognition of the fact that it is in the public interest to employ a surveyor for the services referred to above. When an architect or engineer is employed in conection with the preparation of the design and the supervision of the work, a surveyor to prepare documents for the purpose of obtaining tenders and to deal with all questions of value, and a contractor to carry out the construction, the employer has at his command expert knowledge in the three great divisions of work thus indicated, and so obtains the best results.

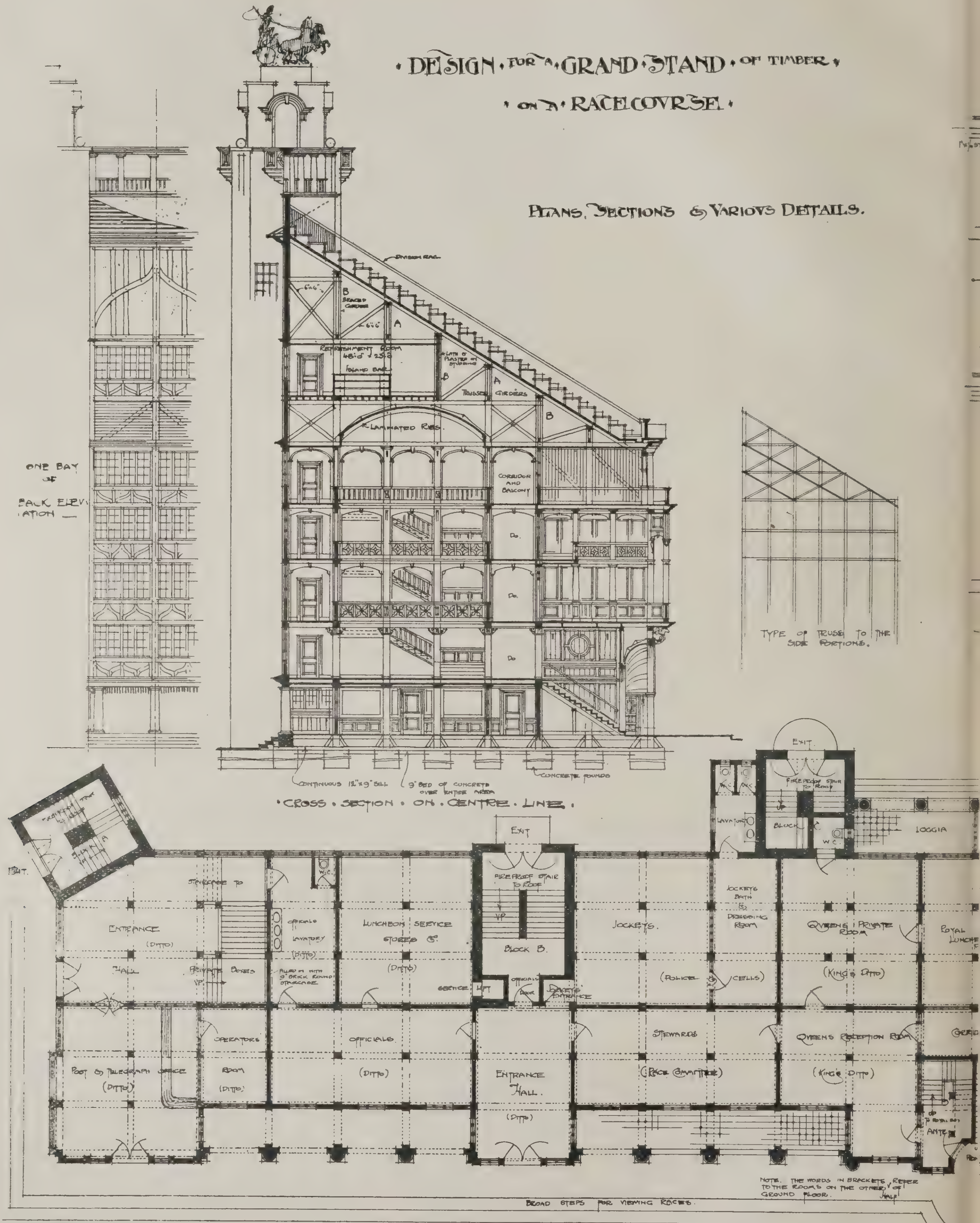
When, however, the practice of inviting surveyors to tender for employment is resorted to, irresponsible persons with little training, knowledge or experience may quote fees at which they would be ready to supply quantities, but which would be an altogether inadequate remuneration for the amount of detailed work involved in their accurate preparation, and for the responsibility incurred.

Bills of quantities obtained by this method are likely to be incorrect, and not infrequently result in serious differences between the parties concerned, and in consequent loss to the employer or the public. While recognising that public bodies invite tenders from surveyors with the best intention, viz., that of guarding the public purse, the council would point out that any system by which the financial return for professional work is reduced below the point at which it becomes remunerative to properly trained and qualified men must tend to lower the professional standard, and so, in the long run, prejudice the public, who unknowingly have to depend so largely on the ability and integrity of the surveyor. The loss occasioned to the public by bad or inaccurate quantities far more than counterbalances the small saving in fees resulting from the system of tender.

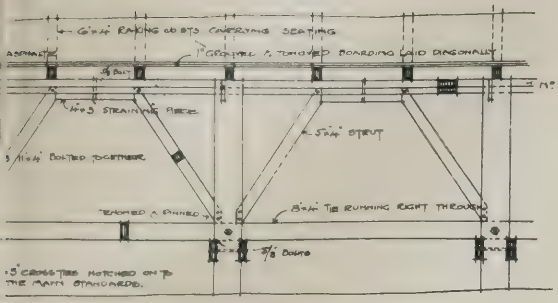
The council greatly deprecate the practice of inviting tenders for the preparation of quantities, which appears to them an altogether unsuitable mode of engaging professional services, and desire to point out that a similar course would not be pursued in engaging the services of a medical officer, a solicitor, or a barrister, although character and experience are no more essential in those professions than in that of a surveyor. They would recommend, therefore, that public bodies requiring the services of a surveyor should first settle under competent advice the remuneration to be paid, and then select a person or firm from a list of suitable surveyors prepared to undertake the work. The fees which should be paid vary widely according to the character of the work, and the council would, if desired, be willing in an honorary capacity to advise public bodies desirous of settling the proper fee to be paid for any particular work.

Obituary

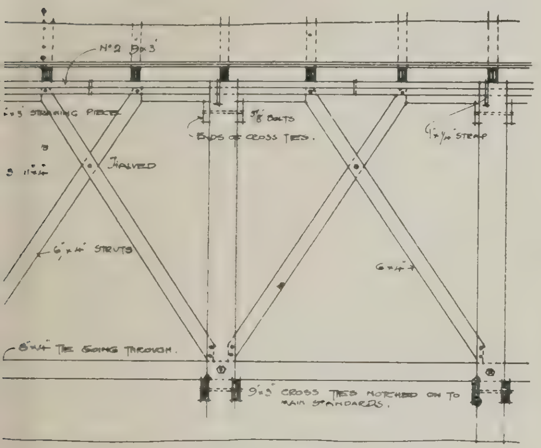
Mr. A. Maryon Watson, B.A., A.R.I.B.A. died recently. He was only 35. He obtained considerable success in connection with the Institute prizes, and after completing his articles he spent some time on the Continent, subsequently entering the office of Sir Aston Webb, and late going into partnership with his father, Mr. Thomas H. Watson, F.R.I.B.A.


· DESIGN · FOR · A · GRAND · STAND · OF TIMBER ·
· ON · A · RACECOURSE ·
PLANS, SECTIONS & VARIOUS DETAILS.
ONE BAY OF BACK ELEVATION
DIVISION RAIL
B BRACED GIRDER
6'6"
A
REFRESHMENT ROOM 48'0" × 25'0"
ISLAND BAR
LATH & PLASTER ON STUDDING
TRUSSED GIRDERS
LAMINATED RIBS.
CORRIDOR AND BALCONY
Do.
TYPE OF TRUSS TO THE SIDE PORTIONS.
CONTINUOUS 12"×9" SILL
9" BED OF CONCRETE OVER ENTIRE AREA
CONCRETE FOUNDS
· CROSS · SECTION · ON · CENTRE · LINE ·
EXIT
FIREPROOF STAIR TO ROOF
BLOCK B.
ENTRANCE (DITTO) HALL
STAIRCASE TO PRIVATE BOXES
UP
OFFICIALS LAVATORY (DITTO)
W.C.
FILLED IN WITH 9" BRICK ROUND STAIRCASE
LUNCHEON SERVICE STORES &c. (DITTO)
SERVICE LIFT
OFFICIALS DOOR
JOCKEYS' ENTRANCE
JOCKEYS.
JOCKEYS BATH & DRESSING ROOM
(POLICE CELLS)
POST & TELEGRAPH OFFICE (DITTO)
OPERATORS ROOM (DITTO)
OFFICIALS (DITTO)
ENTRANCE HALL. (DITTO)
STEWARDS (RACE COMMITTEE)
LAVATORY
BLOCK
W.C.
LOGGIA
QUEENS PRIVATE ROOM (KING'S DITTO)
QUEENS RECEPTION ROOM (KING'S DITTO)
ROYAL LUNCHE
CORRID
UP TO ROYAL BOX
ANTE
BROAD STEPS FOR VIEWING RACES.
NOTE. THE WORDS IN BRACKETS REFER TO THE ROOMS ON THE OTHER HALF OF GROUND FLOOR.
· HALF · GROUND · FLOOR · PLAN ·

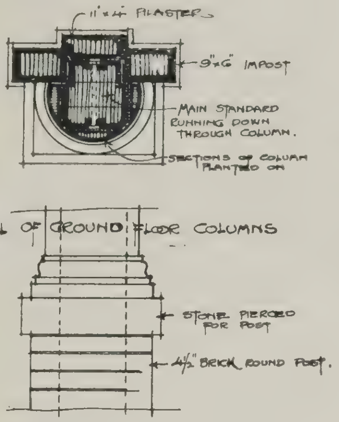
GRISSELL GOLD MEDAL D

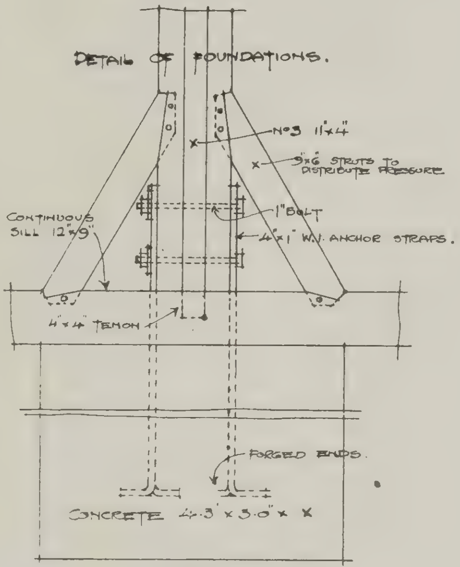

6"×4" RAKING JOISTS CARRYING SEATING
ASPHALTE
1" GROOVED & TONGUED BOARDING LAID DIAGONALLY
5/8 BOLT
No 2 9"×3"
4"×3 STRAINING PIECE
5"×4" STRUT
11"×4" BOLTED TOGETHER
TENONED & PINNED
8"×4" TIE RUNNING RIGHT THROUGH
5/8 BOLTS
3" CROSS TIES NOTCHED ON TO THE MAIN STANDARDS.

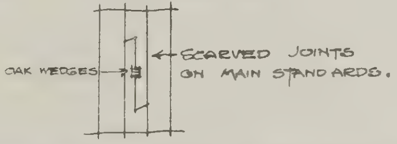
DETAIL OF TRUSSED GIRDERS "A"



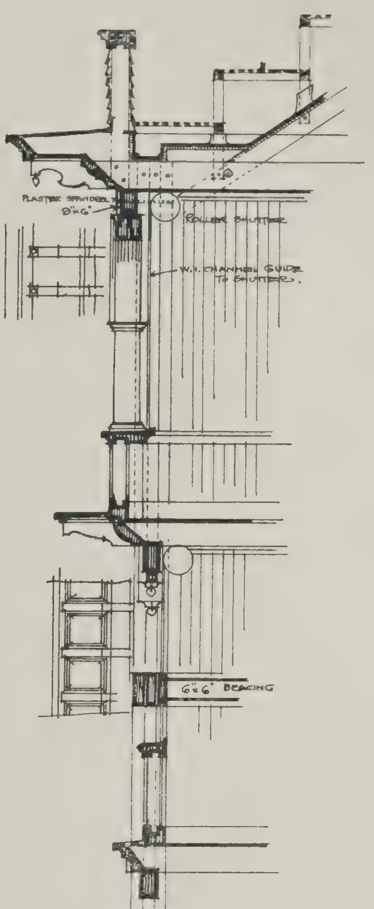
DETAIL OF TRUSSED GIRDERS "B"


11"×4" PLASTER
9"×6" IMPOST
MAIN STANDARD RUNNING DOWN THROUGH COLUMN.
SECTIONS OF COLUMN PLANTED ON
DETAIL OF GROUND FLOOR COLUMNS
STONE PIERCED FOR POST
4½" BRICK ROUND POST.

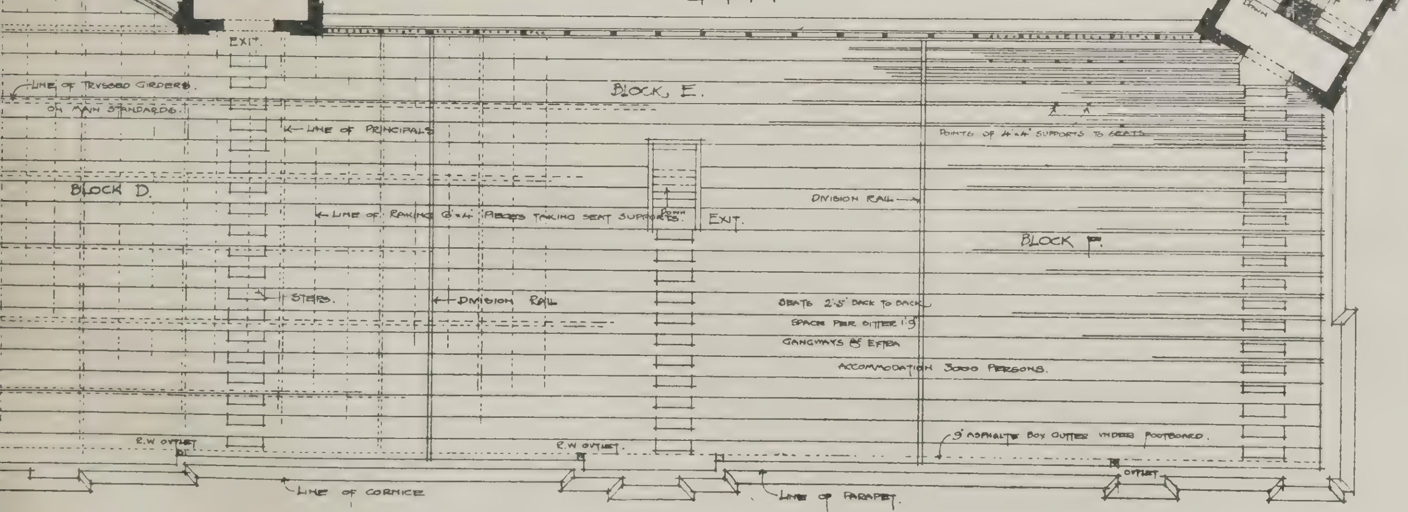




SCARVED JOINTS ON MAIN STANDARDS.



DETAIL OF FRONT ELEVATION SIDE PORTIONS.



· HALF · ROOF · PLAN. ·

BY W. A. MELLON.

R.I.B.A.

Modern Church Planning.

A meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W., the chair being occupied by Mr. Leonard Stokes, vice-president.

Two papers on "Modern Church Planning" were read by Sir Charles Nicholson and Mr. Hubert C. Corlette.

Sir Charles Nicholson's Paper.

Sir Charles Nicholson, in opening, acknowledged our indebtedness to recent writers and lecturers on modern church building. Just as Pugin and Beresford Hope in the middle of the last century were instrumental in killing the Gothic style of the Peel churches, so later critics have put an end to the fashion of imitating the eccentricities of men like Butterfield or Burges in buildings which lack the grace and sense of proportion that give distinction to the works of those masters.

Touching the smaller and simpler types of churches, the factor which the architect should bear in mind when designing such buildings is the necessity for restraint and simplicity.

The importance of a simple plan cannot be over-estimated in our smaller churches, and in such buildings it is not always necessary or desirable to sacrifice too much for symmetry. Thus, under certain conditions, good results can be obtained by planning a moderate-sized church with a nave flanked by an aisle of fair width on one side only. Promoters of church-building schemes are apt to make a fetish of an unobstructed area full of pews in front of the chancel and altar. There is no real necessity to place the altar and chancel in full view of all the worshippers, especially when everybody possesses a Prayer-book and can read it. The question of placing the pulpit in a conspicuous position, and of making the preacher audible to the congregation, can generally be solved in a church divided up into spans of reasonable width, and carried upon fairly light arcades, especially if the Continental and old English plan be adopted of placing the pulpit about a third of the way down the nave, so arranging the seats that those placed east of the pulpit should be capable of being turned round during the sermon.

Although the passage-aisle type of church is capable of producing imposing architectural effects, these are only possible where the height is ample; the plan is therefore a costly one, and unless ample funds are available it is better to adhere to a more economical type of design. An effect of internal spaciousness can be best attained by dividing up a church into two or three spans of fair width and height, rather than by exaggerating the dimensions of the central avenue and tacking on a pair of aisles like cottage sculleries.

As regards the style of our churches, the author referred to the fashion of deriding modern Gothic. It will be conceded that the type of work which has been developed from late Gothic models has grown up into a fairly well-understood manner of architectural expression, which is both modern and English and church-like. This being so, asked the author, is it worth while to cull Byzantine or Classic details for the sake of mere novelty, or to imitate or invent features which are merely picturesque, quaint, or even grotesque? Surely it is wiser to recollect that fashions which are merely odd are bound to change rapidly, and to devote our superfluous energy to the perfecting of planning and the development of construction. The secret of Bentley's success at Westminster lies in its solution of such problems as the construction of a fire-proof roof system and the possibilities of vaulting a large building in concrete, and not in the clever compromises between Classic and Byzantine detail with which his work is adorned. And the wholesomest fruit of the Gothic revival is to be found in the series of vaults which Pearson poised with consummate skill over many of his churches, rather than in the miles of correct thirteenth-century Lincolnshire mouldings with which he covered his cathedral at Truro.

Mr. Corlette's Paper.

Mr. Hubert C. Corlette, treating of the practical requirements of a church which should be satisfactory both ecclesiastically and architecturally, said that first the building must be suitable for the locality in which it is to rise.

Experience has shown that the *mensa*, or slab, the table-top, which is the altar itself, apart from its supports, should not be less than 7ft. by 1ft. 8ins. But 8ft. is better as a minimum length; and the top of the altar-stone should not be less than 3ft. 3ins., nor more than 3ft. 6ins., high above the foot-pace or platform upon which it stands. The altar should be so placed in the sanctuary that the length of it is north and south, with the long sides towards the east and the west. The altar need not be so placed as to be in full view of the whole congregation. But it is not desirable that it should be altogether hidden and screened. The altar should be raised above the level of the nave floor. There should be one step, and one only, at the entrance to the sanctuary from the choir.

The reredos gives opportunity for the use of some of the highest forms of artistic expression, both as regards colour and form. If there is unlimited room, and a really fine sanctuary may be had, let it be large. Then the altar and platform may be well detached from the east wall, and stand forward into the sanctuary with advantage. There may be the steps close to the platform, returned round it, with a wide space between the lowest of these and one or two carried across the entire sanctuary. On the other hand, if the site is in a town, it may be confined, and a limit placed upon the space available for a sanctuary. If this is so, everything should be done that is possible to make the sanctuary worthy of the object for which it is used. But it must be convenient, useful first, and dignified. All actually unnecessary steps should be discarded.

The true place for any distinction between one division of the church and another is at the entrance to the sanctuary, not at the entrance to the choir. If anything in the nature of a chancel arch is used, let it be placed above the entrance to the sanctuary. The screen might then be placed there on a step above the choir floor, and the altar-rail at a convenient distance five or six feet eastward of this. This would be a suitable position for the rood screen in a modern church with a choir of laity.

The custom of placing the lay singers in the choir between the nave and the sanctuary is an innovation. But as it has so largely been accepted, architects must deal with it as well as they can.

If the choir is to be raised at all above the nave floor level, it will undoubtedly be best that all the steps should be collected together at the entrance to the choir from the central passage of the nave. It is not, however, necessary that the choir should be raised. But when it is lifted up, from one to three steps of 6ins. rise and 12ins. tread will be quite sufficient.

Discussing musical requirements, the author advised that the organ should not be enclosed within a brick or stone box of building materials.

As regards seating, there are well-defined and generally accepted rules which need not be departed from. In setting out the area for seating the simplest method is to allow 3ft. from back to back either of benches or chairs. The author favoured chairs as the best solution of the difficulty of disposal of hats.

In even a small church the central passage of the nave ought to be no less than 4ft. wide; it is better to be at least 5ft. or 6ft. Side passages should not be less than 3ft. in width, however small the church may be. If these side passages are in aisles in which there is seating other than that properly in the nave, it will be necessary to make them 4ft. wide. The cross-passage between the seating in the nave and the western limit of the choir may be 4ft. across, if it is not likely to be used extensively. But if the choristers approach the entrance to the choir from the vestry by this passage it should not be less than 5ft. or 6ft. wide. The cross-passage at the west end of the church should be regarded more as a narthex, or internal western porch, than otherwise. And it might be screened from the nave.

If ample space is allowed at the west end there will be room not only for ingress and egress, and the placing of the font as an important essential of the plan, but this will also, perhaps, make it possible to provide some convenient receptacle where umbrellas, sticks, and superfluous coats, wet or dry, might be deposited.

In allowing for the pulpit in the plan the first requisite is that it shall be so placed that the speaker may be heard well in any part of the building. It is, in England, usually found on the north side, not far from the entrance to the choir. But in a large church it might, with advantage, be somewhere near the centre of the nave, on the north or south side, close to the wall or arcade of the church.

In nearly all well-equipped churches it is considered necessary to provide a small side chapel. It need not be a distinct portion of the building, but may be separated by a screen from the body of the church.

Generally two vestries will suffice: one for the clergy and one for the choristers. They should be close together. And it is often convenient if the two may be thrown into one.

A vote of thanks to Sir Charles Nicholson and Mr. Corlette was proposed by Mr. G. H. Fellowes Prynne, seconded by Mr. H. H. Statham, and supported by Mr. Maurice B. Adams and Mr. E. P. Warren.

Proposed Secondary School for Girls at Chiswick.—A scheme for providing a secondary school for girls at Chiswick at a cost of £12,000 is on foot, and a sub-committee of the Chiswick Educational Committee is now considering the matter.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The querist's name and address must always be given, not necessarily for publication.

Strength of Reinforced Concrete Floor.

WHITEFIELD.—RETLAW writes: "Referring to Prof. Adams's reply to 'Glasgow' about the strength of reinforced concrete in your issue for January 23rd, I shall be glad to know whether the formula given is for breeze concrete or ballast; also, how is the percentage of reinforcement reckoned? Is it half the 3×3 r.s.j. to concrete 2ft. 6ins. $\times 5\frac{1}{2}$ins., or the full area of 3×3 r.s.j., to the same amount of concrete?"

No difference is made in the formula for breeze concrete or ballast concrete, but broken brick concrete is preferable, and the formula was specially intended for that material. The concrete should be composed of 1 cement, 2 sand, 4 broken brick to pass $\frac{1}{8}$-in. to $\frac{3}{4}$-in. gauge. In calculating the percentage of reinforcement there will be one 3-in. × 3-in. × 8·5-lb. joist to each bay of 2ft. 6ins. or $\frac{2{\cdot}5 \times 100}{5{\cdot}5 \times 30}$ = say, 1·5 per cent.

HENRY ADAMS.

Book on Sanitary Science.

BRIGHTON.—H. M. P. writes: "Which is the best book on sanitary science, at a moderate price?"

We know of no one book covering the wide field of sanitary *science*. If you mean sanitary engineering, we recommend Francis Wood's "Practical Sanitary Engineering," post free 8s. 6d., from these offices.

Disposal of Soil.

RURAL SANITATION writes: "I should be glad to know of any book or books dealing fully with the disposal of soil and urine by means of earth or similar closets in such a way as to obviate the necessity of removing the soil, &c., from the premises. I have seen one or two cases where the soil and urine were deposited in ordinary pans under the seats of the closets, and dry earth sprinkled over by means of a shovel; then at the end of the week the buckets were emptied and the contents spread out in a drying shed. The earth was re-used after a sufficient period had elapsed for the complete disappearance of the soil, &c., leaving it in a similar condition to that before use. What I am anxious to know is, in the case of buildings such as small schools and hospitals situated in rural districts, whether it is possible to successfully utilise this or a similar method for dealing with the refuse soil and liquid deposited in the closets."

The process you describe would be quite possible, but hardly a pleasant one. Why not bury the filth and use fresh earth? The dissolution of the earth and paper would occupy a considerable time, and storing the matter in a shed meanwhile might be dangerous. It would be much better to use the ordinary earth or tub closet. With Moule's and other earth-closets there is a receptacle for dry earth, a quantity being deposited on each evacuation by moving a lever, very much after the manner of the water-closet flush; the tub being removed every day or so as found necessary, and replaced by another tub which has been cleaned and deodorised. The contents of the full tub are cleaned out and buried under a few inches of soil and the tub is then cleaned and deodorised ready for re-use. This system is perfectly applicable to small schools; but ranges of earth-closets should be kept away from the school buildings. In the case of hospitals, earth-closets must be separated from the main buildings, connected only by a short covered way or lobby open to the air. The system is more objectionable in the case of hospitals, as it is hard on the nurses to have to take bed-pans, &c., across to the closets in all weathers—and equally impossible in most cases for the patients to go themselves.

Use of Cresset Stone.

PORTSMOUTH.—R. J. J. writes: "What was the use of a cresset stone?"

A "cresset" may be either a lamp or light kept burning near the altar of a church in the Roman ritual; or, alternately, a beacon or torch displayed at some point, such as a tower, where it may be seen as a signal. The "cresset stone" which you mention is probably the bracket upon which the altar-light stood, or from which it was suspended.

Fireplaces for Peat.

STAPLEHURST.—B. writes: "Referring to your reply about fireplaces for burning peat and your expression of wonder at receiving several enquiries on this out-of-the-way subject, I think the reason is to be found in the competition for labourers' cottages for Dublin, one of the clauses in which competition was to figure in the difference of fireplaces for coal and peat where peat was used."

Law Cases

Hennebique System of Reinforced Concrete: an Injunction.—The case of *Mouchel v. Cubitt & Co.* was heard in the Chancery Division of the High Court of Justice last Wednesday. The plaintiff is the sole general agent for the United Kingdom for the Hennebique system of reinforced concrete construction. The defendants are a firm of London building contractors. By an agreement dated March 2nd, 1903, the plaintiff granted the defendants a license to carry out work on the Hennebique system within "the town of London," and clause 12 of this agreement stipulated that the defendants should not, "without the written consent of the plaintiff, carry out or contract to carry out any ferro-concrete or similar work which may be an infringement of the said patents, or be in competition with the same." The present action was commenced by the plaintiff in June last on the ground that the defendants had committed a breach of clause 12. The defendants admitted that they had carried out a small amount of concrete work on a different system for the Whitbread Brewery Co., but except for this they denied any breach of clause 12, and, moreover, they alleged that that clause was void, being wider than was necessary for the protection of the plaintiff, and also injurious to the public interest, and an undue restraint on the defendants' trade. —Mr. Justice Neville, in giving judgment, said he considered that the words "at any time" were limited to the duration of the license and extended no further, and that this was the reasonable interpretation of the contract. He therefore granted the plaintiff an injunction in the terms of clause 12, but limited to the duration of the license.

ARCHITECTURAL DIS-ORDERS COMPETITION.

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The competition is divided into two parts—the first appealing mostly to students and practitioners of architecture and the second more especially to those practically engaged in constructional work. The most valuable prize will be given for the highest number of correct solutions of all the pictures in both divisions, but the rest of the prizes will be allocated to two classes, so that every reader will stand a fair chance of winning a prize—*i.e.*, there will be no privileged class.

As regards division A (architecture) we would call attention to the fact that a number of the questions will directly relate to the Orders of architecture, these being wrongly drawn in some way or other: and in solving these questions it will be found very useful to refer to the series of articles published recently in our columns under the title of "Practical Notes for Architectural Draughtsmen," by Messrs. Alfred W. S. Cross and Alan E. Munby, which series is being separately published as plates for use on the drawing-board.

The pictures in the "Architectural Dis-Orders Competition" will be published each week for 26 weeks in THE BUILDERS' JOURNAL, the first set having been given in the issue for February 6th, and the second set in last week's issue.

Competitors may send in as many sets of solutions as they please, provided they are in accordance with the conditions.

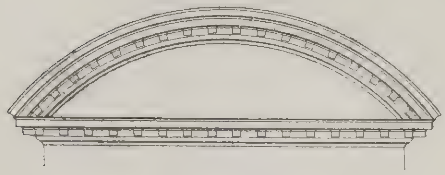
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, **6, Great New Street,** London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Third Series.)

CLASS A (ARCHITECTURE).



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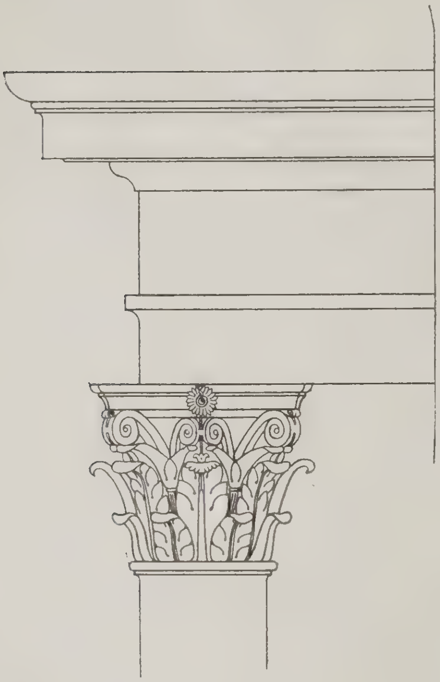

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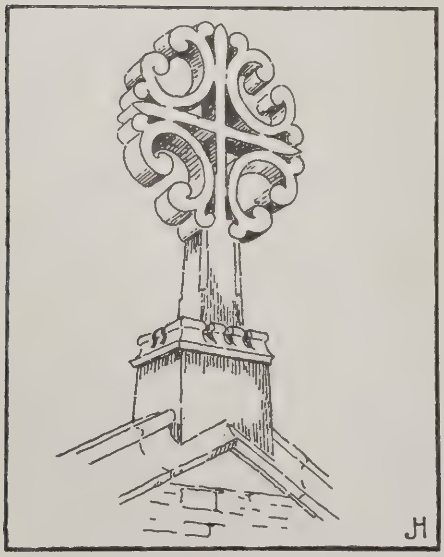

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THE PRIZES.

£20, and 50 other valuable prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions to the question "What is wrong?" in relation to each of the drawings published in the "Architectural Dis-Orders Competition." The winner, or winners, of this special prize will not be eligible for any of the other prizes offered.

The remainder of the prizes are divided into two classes, as follows:—

Class A (Architecture).

1st Prize.—£10.

2nd Prize.—Morocco leather pocket case of German silver instruments, comprising 5-in. sector-jointed compass, with double knee-joints, hair spring attached to the divider leg of compass, nut and bolt needle points, pen and pencil legs, lengthening bar, set of three spring bows, ruling pen.

3rd Prize.—Leather case of instruments, containing 4-in. German silver bow compass, hinged pen and pencil points, needle or lead holder, and handle to take pen or pencil leg.

4th Prize.—Leather case of beam compasses, with tangent screw adjustment, and needle points (electrum).

5th Prize.—Architect's pine drawing board, grooved, with mahogany battens, brass slots and screws to allow of contraction. One edge inlaid with ebony. Size 28ins. by 21ins.

6th Prize.—A morocco pocket case containing an English set of three spring bows, with steel heads and steel points (divider, pen and pencil).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case containing 5-in. brass barrel compass, $4\frac{1}{2}$-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

9th Prize.—A brass proportional compass, 6-in., partly divided.

10th Prize.—A pocket divider, electrum.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

Class B (Building).

1st Prize.—£10.

2nd Prize.—Abney level in morocco case, with 5-in. rack and vernier.

3rd Prize.—Best English-made electrum *Napier* pocket compass.

4th Prize.—A drawing set, comprising drawing-board (size 23ins. by 16ins.), 24-in. T-square, 2 large set-squares, and set of instruments in rosewood case, comprising 4-in. brass divider, needle-pointed compass with pen and pencil points, bar, patent pencil point, slip rule, &c.

5th Prize.—A pair of builder's rods, spring-jointed.

6th Prize.—A pair of builder's rods (not jointed).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, contining 5-in. brass barrel compass, $4\frac{1}{2}$-in. round-pointed divider, 2 wood set-squares, celluloid protractor, and 6-in. diagonal scale.

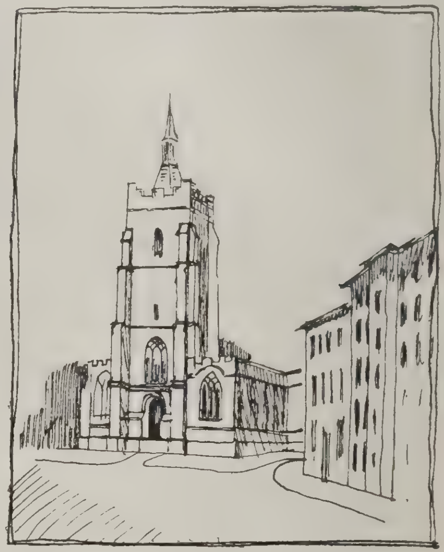
9th Prize.—Spirit level, 15ins., brass-faced.

10th Prize.—2-ft. fold-up boxwood rule, brass-jointed, fully divided, 4 bevels.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

(For Coupons see page xxi.)

CLASS B (BUILDING).



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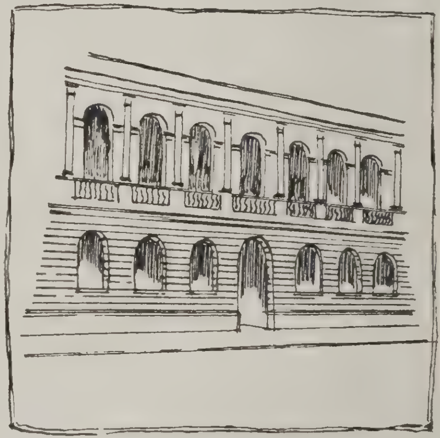

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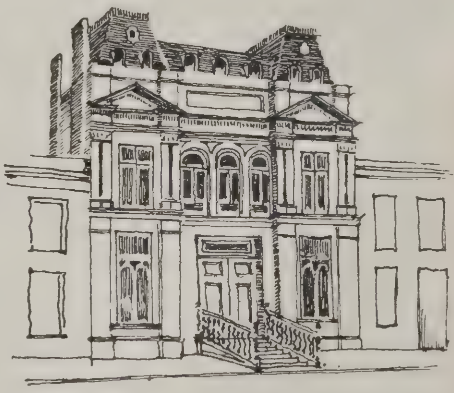

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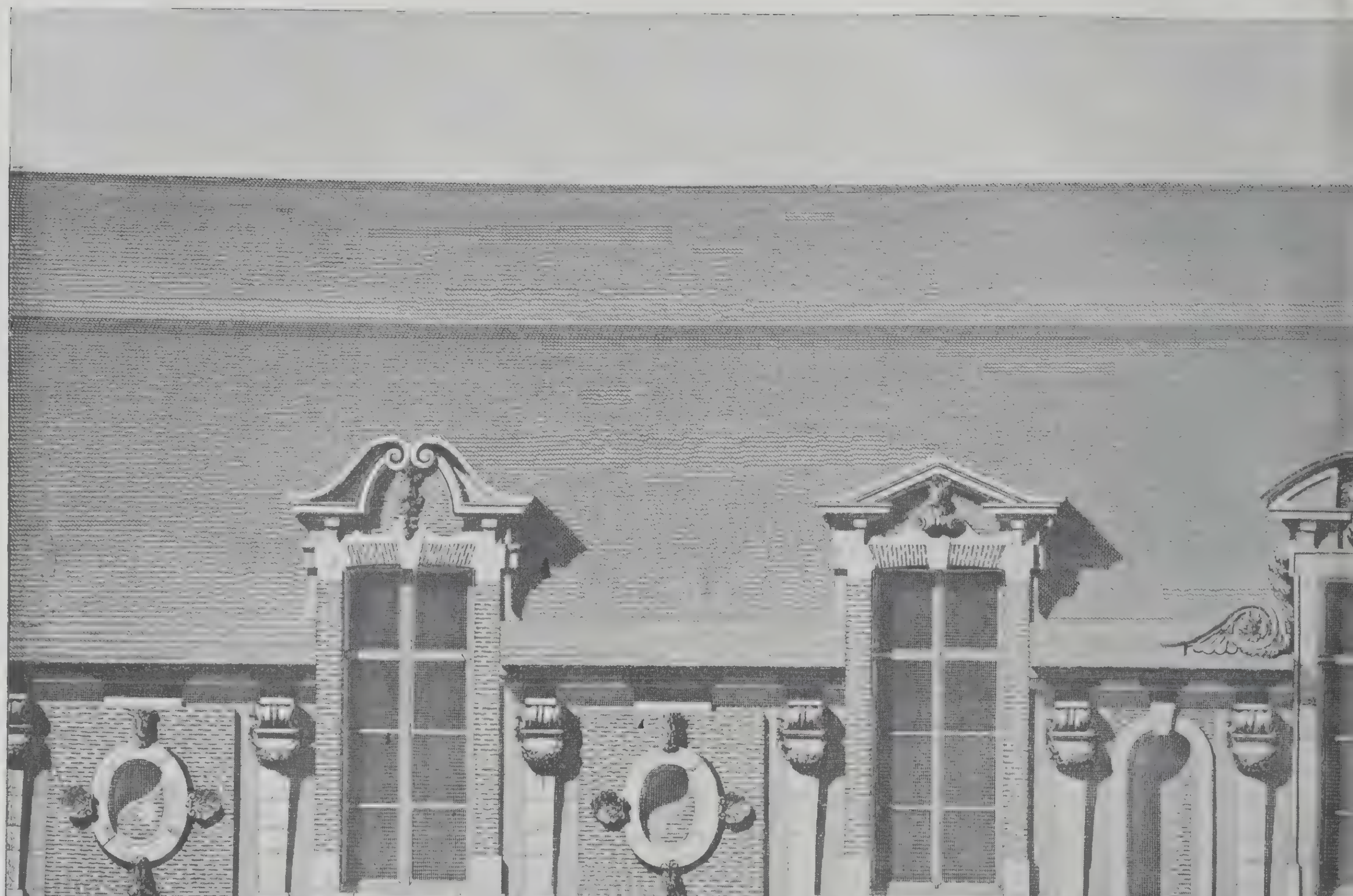

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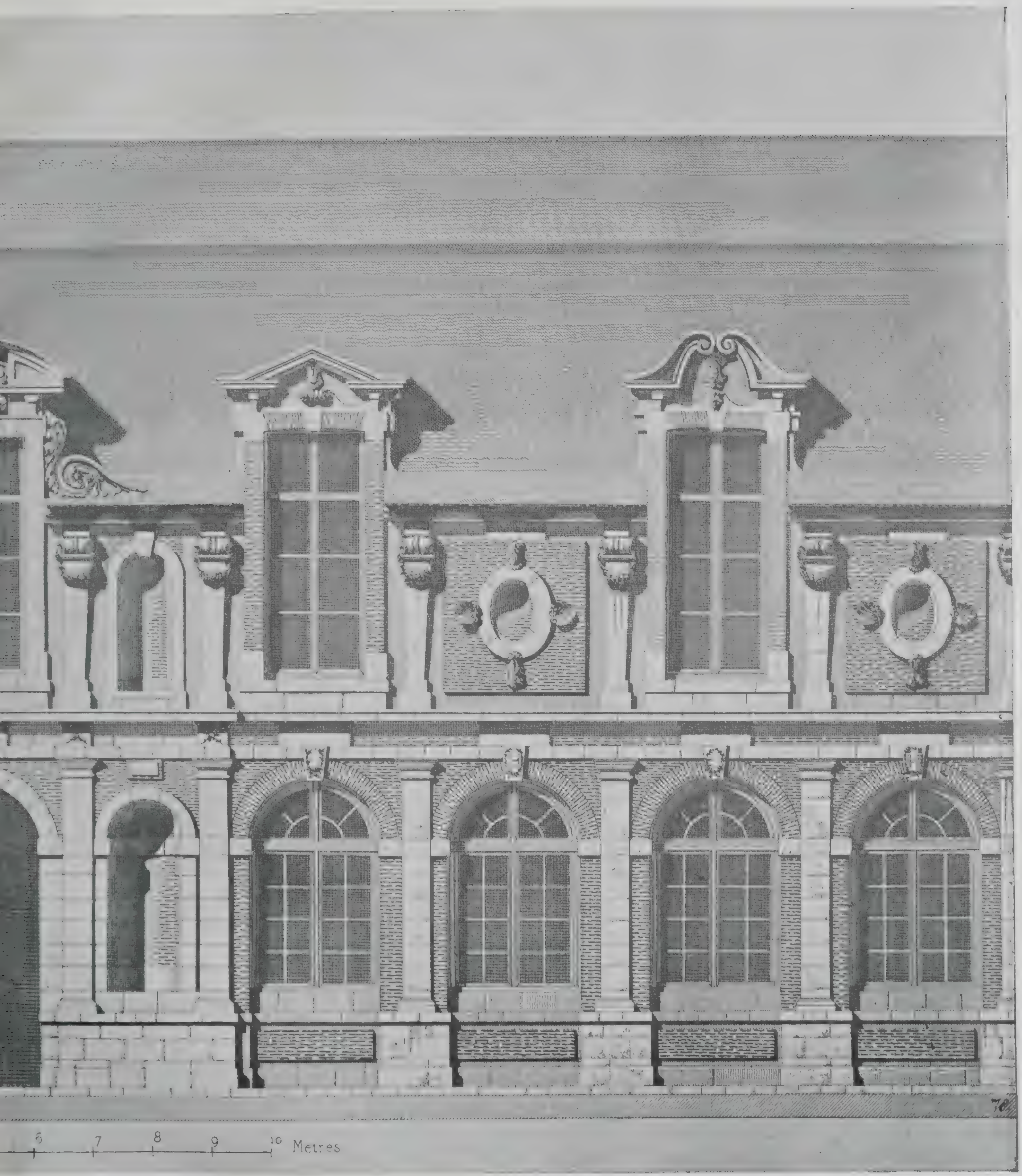

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February 27, 1907. Volume 25, No. 629

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AND ARCHITECTURAL ENGINEER.

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Doubts as to London's Sewers.

THE sewerage of London is a gigantic undertaking which has been ceaselessly under construction and extension for many years past. It was embarked upon by the old Metropolitan Board of Works, and is now in the hands of the London County Council. London's main drainage system comprises nearly 300 miles of main, storm-relief, intercepting and outfall sewers, nine pumping stations, and two sewage precipitation stations. The total capital outlay on the existing system has been about £10,000,000, while its annual maintenance amounts to about £250,000. The existing sewers are not all that can be desired, and the London County Council, in 1900, adopted a comprehensive scheme for enlarging the main drainage system. The construction of the new outfall sewers was begun in 1901-2. In 1904 the Council supplemented this by a scheme for extensive flood-relief works. In all, a capital cost of about £4,000,000 will be involved. There is grave reason to doubt whether this enormous expenditure will fulfil the avowed purpose of reducing the liability of premises to flooding during storms, and it looks as if much of the money will be thrown away. For fully 51½ weeks in the year the present sewers are quite capable of taking—and, as a matter of fact, do take—all the water they are called upon to remove. What of the other half week? Only twice does back-flooding occur in the 24 hours of any day, and it never lasts more than 2 to 4 hours. The back-flooding occurs at high tide and results from the rush of water not being able to escape into the Thames by the numerous outlets provided, thus choking the sewers, backing-up in them, and forcing its way through the intercepting traps of the houses and street gulleys. How can the new storm-water relief sewers help to relieve this? When the water rises in the river the openings for letting the storm-water escape would allow the river water to fill the sewer, so floodgates or sluice-valves are provided. But these are never perfectly closed, and the sewer is filled by the incoming tide. Even if they were, the rush of storm-water would fill the sewers, and the water would back up. No, the remedy is not in storm-relief sewers. Apparently the only possible course (and this is the most economical) is to prevent the water escaping through the intercepting traps by inserting non-return valves in all sewer inlets in the low-lying districts, so that the water may back-up until it gets a head sufficient to force the floodgates and escape into the stream. This would only be a little above the level of the tide, for water finds its own level. The cost of providing such anti-back-flooding valves would be less than £600,000. The adoption of such a scheme in the past would have prevented the existing troubles and have effected an enormous saving. It is surprising that the engineers responsible for London's main drainage never realised the real nature of the problem and never adopted such an obvious solution.

New, True, or Neither

Excited to emulation of the L.C.C. by the evening papers, the Uxbridge Urban Council has worked up a brick scandal of its very own. There have been four sittings of the council to deal with various ramifications of the subject, and, amid stormy scenes, the motion that the bricks had been unearthed, and should be threshed out, was lost by the casting vote of the chairman, who decided that even if the bricks had been unearthed it was still not desirable that they should be threshed out.

* * *

At the recent meeting of the Institute when papers were read on the subject of marbles, the question of the ethical propriety of marble veneer was not raised, although it is a subject that aroused wide discussion in the past when this use of marble was generally considered, by choice spirits, to be a naughtiness. Mr. Ruskin, bound in the thralls of his own precepts, felt unable to countenance the use of thin marble slabs, on the ground that they sought to impress the beholder with a sense of solid blocks built into the fabric, and he was hard put to it to exonerate his favourite Italian builders until he noticed that the fastenings used by them in fixing their slabs were not always invisible if one looked sharply. It may, therefore, be accepted as a maxim that propriety in the use of marble veneers relies on the conjunction of good eyesight with bad workmanship.

* * *

I observe that owing to the hardship inflicted upon a certain class of provincial architects by the enactments of a law which came into force on the first day of this year, many men are seeking to re-establish themselves by adding to the list of qualifications printed on their letter paper the words "Commission Agent."

* * *

The Council of the Architectural Association having prohibited students of the Evening School from smoking while at work in the Studio, the following appeal has appeared in the "A. A. Journal":—

O Council, strong as we are weak,
  Look down on us with mercy!
If in his pipe, the student seek
  Some solace, none the worse he.
In offices we spend our days
  With pipe and pouch in pocket:
When day is done—one pipe—just one,*
  In pity, do not dock it!

(* Exigencies of rhyme alone preclude a request for more than one.)

* * *

We cannot be too grateful to Mr. Anstey for "The Man from Blankley's." It enables us incidentally to tell a story which could not otherwise be told. There was once an architect named Blankley, who designed a building which imitated, in its humble way, the Tower of Siloam, and slew sundry people. There was also another architect who sent to his quantity surveyor some drawings which, as it seemed to the wise Q.S., showed a not very sound construction. Surely it was very peevish of that architect to object when he received his drawings again by return of post with "Remember Blankley" scrawled across them in red ink. Some quantity surveyors know too much.

THE LOOKER-ON.

LONGFELLOW AND ARCHITECTURE.

By F. H. Cheetham.

[*Note: The centenary of Longfellow is celebrated to-day, February 27th.*]

Three years ago America celebrated the centenary of her greatest novelist, Nathaniel Hawthorne. To-day she celebrates the hundredth anniversary of the birth of her most popular, if not her greatest, poet—Henry Wadsworth Longfellow.

In considering Longfellow's attitude towards architecture comparison with Hawthorne is almost inevitable.* The two men had much in common as regards education and environment, but there was a fundamental difference in outlook between them, and this difference is exhibited in their attitude towards architecture as well as in everything else. Yet, in some respects, their attitude was the same. Both were impressed by Gothic architecture, and both approached it, like Ruskin, from the moral and æsthetic side rather than from the historical and professional. Yet Hawthorne, despite the fact that he had little of the scholar in him and that Longfellow had much, seems to have had a far greater grasp of the meaning of both Classic and Medieval art than Longfellow ever had. Hawthorne, indeed, was a concentrated genius, while Longfellow was diffused and elusive: he meditates rather than thinks and can only speak of the vague impression that Gothic architecture had upon him. Hawthorne, too, feels this vague impression when face to face for the first time with real architecture in Europe, but he strives to get behind it, and his notebooks and his one European novel show how severely he disciplined his mind in trying to think out the meaning of what he saw. Longfellow, on the other hand, seems to have rested quite satisfied with the vague impression. His European letters and diaries are singularly devoid of references to art and architecture in any form, and had it not been for the fragment "Michael Angelo," found in his desk after his death, we might have sought in vain among his writings for any definite expression regarding his attitude towards architecture.

In "Michael Angelo," however, written during the last ten years of his life (and he died at the age of 75), Longfellow puts some very definite words concerning architecture into the mouth of his hero, though how far they are Longfellow's own expression of opinion is an open question.

The great Italian is made to express himself thus:—

> Ah, to build, to build!
> That is the noblest art of all the arts.
> Painting and sculpture are but images,
> Are merely shadows cast by outward things
> On stone and canvas, having in themselves
> No separate existence. Architecture
> Existing in itself, and not in seeming
> A something it is not, surpasses them
> As substance shadow.

And later, when he is engaged on the building of St. Peter's, Michael Angelo says, addressing Benvenuto Cellini:—

> The most majestic
> Of the three sister arts is that which builds;
> The eldest of them all; to whom the others
> Are but the handmaids and the servitors,
> Being but imitation, not creation

Longfellow, therefore, is on the side of the angels. But his appreciation of architecture in the general is greater than his knowledge of it in the particular. Hawthorne was nearly 50 years of age when he came to Europe and saw real architecture for the first time. His mind was mature and the best part of his work was done. Longfellow visited Europe first as a young man of twenty. He spent three years—from 1826 to 1829—in France, Spain, Italy, and Germany. Hawthorne first saw Gothic architecture in England. His first Gothic building was Bebington Church in Cheshire, and afterwards Chester Cathedral. Longfellow first saw the work of the Medieval builders in France, and his first Gothic building was Rouen Cathedral. But the man of fifty has left us a far more definite picture of his impressions than the much-travelled poet, who first made the acquaintance of the world of Art as a youth of twenty. Longfellow, it must be confessed, did not materially add to our knowledge of his real appreciation of architecture during the three other visits he paid to Europe in 1836, 1842 and 1868. Still, what references there are to his artistic impressions are interesting, and a few may here be given.

One result of his first visit to Europe was the volume "Outre-Mer." This book contains an account of what he saw and did in France, Spain, and Italy. Rouen made a great impression on him: "So strong and delightful was the impression that it made upon my youthful imagination that nothing which I afterwards saw could either equal or efface it." Perhaps this entering Europe by way of France made Longfellow a Goth. Or is it that Americans, by nature of contrast, are always Goths when they come to Europe? Longfellow came across Rouen Cathedral unexpectedly: "If it had suddenly risen from the earth the effect could not have been more powerful and instantaneous. It completely overwhelmed my imagination. I had before seen no specimen of Gothic architecture and the massive towers before me, the lofty windows of stained glass, the low portal with its receding arches and rude statues, all produced upon my untravelled mind an impression of awful sublimity. I was transported back to the Dark Ages and felt as I can never feel again." To Longfellow the later as well as the early Middle Ages are always "Dark." The expression affords a sidelight upon his outlook on things, for however we may regard it, whether as used deliberately or carelessly, the phrase is significant. To him the whole of the period of the Middle Ages may have seemed an age of darkness, or he may merely have been employing the term loosely without thinking particularly what it meant. That this latter view is the more likely one may be gathered from the extraordinary way in which he talks about Chambord as "one of the finest specimens of the ancient Gothic castle to be found in Europe," although in the same sentence he admits it is only three centuries old. But he calls it feudal and imagines "revelry and wassail" echoing in its vaulted chambers. This is surely a lapse for a scholar who had just been appointed Professor of Modern Languages!

The Paris of Longfellow's first visit (1826) was a "gloomy city, built all of yellow stone streaked and defaced with smoke dust." The poet, however, has little to say of the architecture of Paris, but goes for a tour to the Loire country and visits Chambord, Blois, and Chenonceau. He is "enchanted" with Chenonceau and returns to Paris by way of Tours, but passes through Chartres without stopping. His Gothic enthusiasm cannot, therefore, have been very great at this time.

In Spain and Italy he is enthusiastic, although he has little to say about their architecture. He finds the dominant note of the Alhambra to be "refinement of luxury," but he passes over Pisa and Florence, Rome and Venice with little or no comment. On his second visit to Europe, however, ten years later, Strasburg Cathedral draws from him this outburst: "When I gaze on a grand Gothic edifice like this my feelings are too dreamy and indistinct to be described. They are like the building itself, so intricate, so curious, so grotesque withal, that words cannot embody them. Music perhaps might."

It is this "indistinct and dreamy" feeling in Longfellow that architecture seems to have been most potent to arouse. In his third visit to Europe we see in the well-known poems, entitled "Nuremberg," and "The Belfry of Bruges," how powerful the spell was. This recognition of architecture in Longfellow's poems may also be seen in such pieces as "Giotto's Tower," "The Builders"—

> In the elder days of Art
> Builders wrought with greatest care
> Each minute and unseen part—

and even in the sonnet "Mezzo Cammui," where he speaks of his own work in the imagery of the builder's art.

But it is hardly in his poetry that we must look for any light on Longfellow's attitude towards architecture. His idea of the spirit of Gothic may be gained from a passage in an article which he contributed to the "North American Review" in 1837. "Some writers of the present day," he says, "have introduced a kind of Gothic architecture into their style. All is fantastic, vast, and wondrous in the outward form, and within is mysterious twilight, and the swelling sound of an organ and a voice chanting hymns in Latin, which need a translation for many of the crowd." Clearly he felt that he did not very well understand what he saw and appreciated. His appreciation is, indeed, born of sentiment rather than of understanding, and his use of architectural terms, when by chance he does employ them, is not particularly happy. In so well-educated a man the use of the word "Romanesque" in the following passage is almost past forgiving:—

"This book," he says, speaking of his novel "Hyperion," "does somewhat resemble a minster in the Romanesque style, with pinnacles and flying buttresses and roofs

> Gargoyled with greyhounds, and with many lions
> Made of fine gold, with divers sundry dragons.

You step into its shade and coolness out of the hot streets of life: a mysterious light streams through the painted glass and marigold windows, staining the crisp and crumpled leaves of the window shafts, and the cherubs of the holy water stoups below. I know not how this Romanesque and at times flamboyant style of architecture may please the critics. They may wish perhaps that I had omitted some of my many ornaments, my arabesques and roses and fantastic spouts and holy roods and Galilee-steeples. But would it then have been Romanesque?"

It is hard to say which it was, let alone what it would have been. But "Hyperion" is certainly more Flamboyant than Romanesque, whatever meaning that term may have had in Longfellow's mind. In this book there is an account of the Castle of Heidelberg which he describes as "next to the Alhambra of Granada, the most magnificent ruin of the Middle Ages in Europe"! Assuredly Longfellow's "Hyperion" must not be regarded as a safe architectural guide for Americans in Europe.

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* "Nathaniel Hawthorne and Architecture. "Builders' Journal," July 6th, 1904.

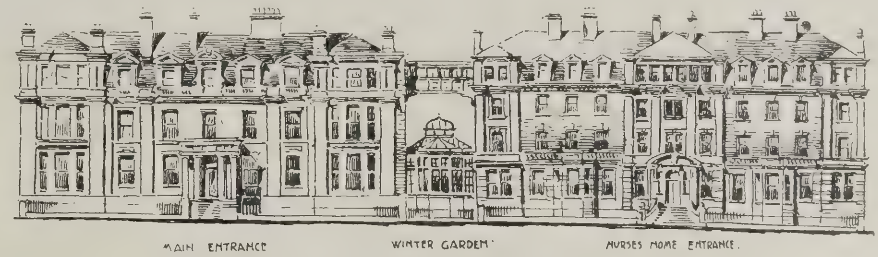
To the classic art of Italy there is scarcely an allusion in the poet's diaries or letters; but that it must have left a strong impression on his mind is evident from the spirit that pervades the unfinished poem of "Michael Angelo." Longfellow's whole attitude towards Art, however, is rather elusive. He voiced the more commonplace thought of the more commonplace minds, and, as he himself has put it, many of his opinions on art and literature recurred to him "in the tender guise of sentiment." When he reads the "Stones of Venice" he remarks that there is a certain magnetism about Ruskin which "for the moment, at least, makes all he says seem true." There is little or nothing of this magnetism about Longfellow, at any rate when he writes about art and architecture. The reason would seem to be that he had no very definite or formulated ideas or convictions on either.

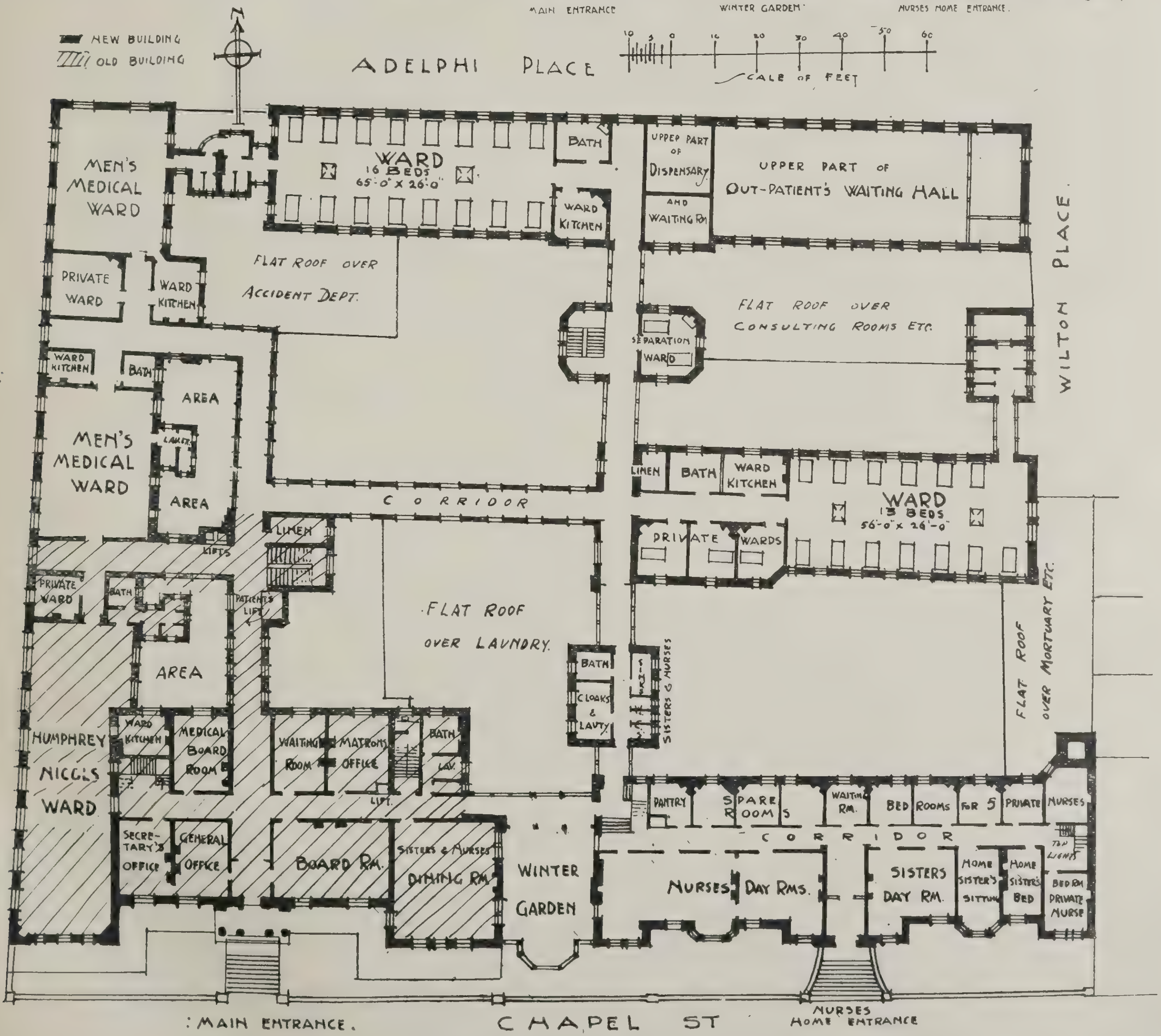
SALFORD ROYAL HOSPITAL COMPETITION.

The governors of the Salford Royal Hospital selected eight leading Manchester architects experienced in modern hospitals to compete in a limited competition for large extensions and alterations to the existing building. The present hospital is the only institution of its kind in the borough of Salford, and for years, owing to the growth of the population, the officials have been greatly hampered by the shortage of beds, and it is expected that the claims upon the hospital will be even greater in the future than they have been in the past.

The proposed building had to be designed to afford additional accommodation, and such further accommodation as the competitors thought desirable. The extensions had to be so planned that they could be erected in the following order:—(1) Accommodation for nurses and staff; (2) alterations to old buildings, accident and out-patients' department, laundry, kitchens, &c.; (3) additions to increase the number of beds from 135 to 200. Accommodation had also to be provided for 102 persons. All new wards had to be on the same level as the present wards, and free access was desirable from the main corridor of the existing building to any new ward.

The site is rather limited, considering the extensive alterations required, and there is also the difficulty arising out of the fact that the main thoroughfare—Chapel Street—is a busy road with heavy traffic passing along it at all hours: this drawback caused the new medical wards to be put as far as possible away from the street—a point which all the competitors observed, so that there is natur-





SALFORD ROYAL HOSPITAL EXTENSION: GROUND-FLOOR PLAN OF FIRST-PREMIATED DESIGN.
JOHN ELY, F.R.I.B.A., ARCHITECT.

ally a similarity in the plans as regards the disposition of the various departments, though they differ in detail and in internal arrangements.

The Committee were unable to specify the amount they intend spending on the new institution, but good, substantial, plain buildings, more or less in keeping with the present structure, were required. Mr. Keith Young assessed the plans on behalf of the governors, and the drawings were on view in the board-room to subscribers to the hospital during last week.

Design Placed First.

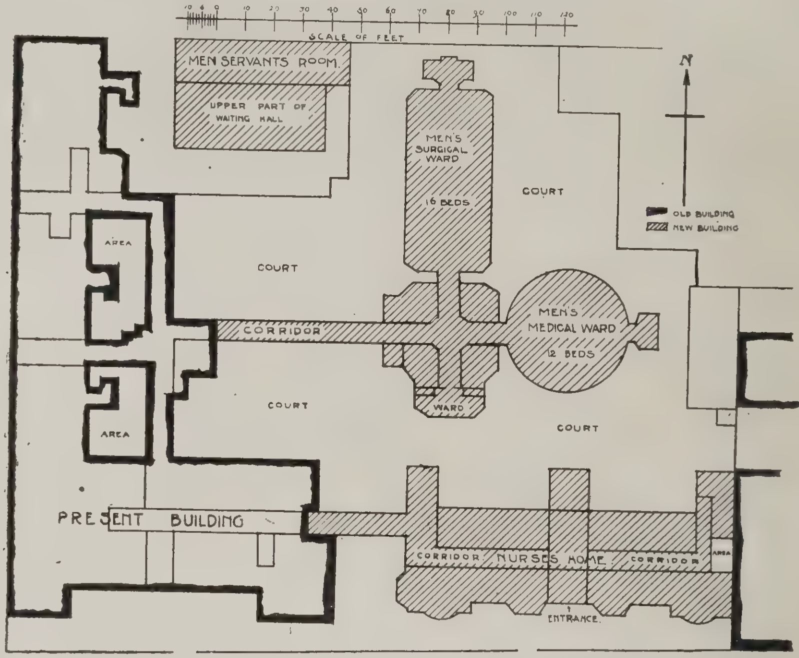
The first premium, £50, has been awarded to Mr. John Ely, F.R.I.B.A., of King Street West, Manchester, and his design has been accepted, subject to certain modifications: when these have been made, the approval of the subscribers to the hospital will be asked, and the work proceeded with. It is expected that the alterations and extensions on the amended scheme will cost £70,000. We give on the preceding page a sketch of the front elevation and the ground-floor plan. An unusual departure from the orthodox hospital type is the axis and position given to the medical wards. All the windows have a south or north light. In this particular case the author has scored a point by thus breaking away from the usual lines, and it has enabled the communication corridors to join all the wards, administration and nurses' home in simple direct lines, with thorough intercommunication between all departments. The corridors seem to have been the most difficult detail to work in correctly; in this respect Mr. Ely's scheme is undoubtedly the best. Some of the departments might be altered with advantage, particularly the position of the mortuary and post-mortem rooms, these at present being situated between a medical ward and the nurses' home, where there is a possibility of smells arising and entering through open windows on the upper floors. The same objectionable feature is noticeable in the wash-house, laundry, &c., which is almost in the centre of the site, surrounded by other buildings; it could have been placed in a more open position. The main corridor in the nurses' home has light only from one end, and one of the stairs is top-lighted and serves four floors. In the basement is the out-patients' waiting hall (it seems very large in comparison with the other schemes) with well-arranged consulting rooms, dispensary and conveniences for both sexes, also entrances and exits for out-patients. The dispensary waiting hall serves as a connecting corridor for medical offices. It is preferable to have the private corridor connected with the main hospital for medical service only and to concentrate the rooms for out-patients as near their exits and entrances as possible. The first floor contains three new wards and is similar to the ground-floor plan in detail. In the nurses' home about twenty bedrooms are shown for sisters and nurses. The administrative portion contains the resident medical officer's and matron's rooms, and two medical wards for women. The second-floor plan, with nurses' mezzanine plan, shows bedroom accommodation for sisters, nurses and staff. On the elevation an endeavour has been made to harmonise with the existing building.

Design Placed Second.

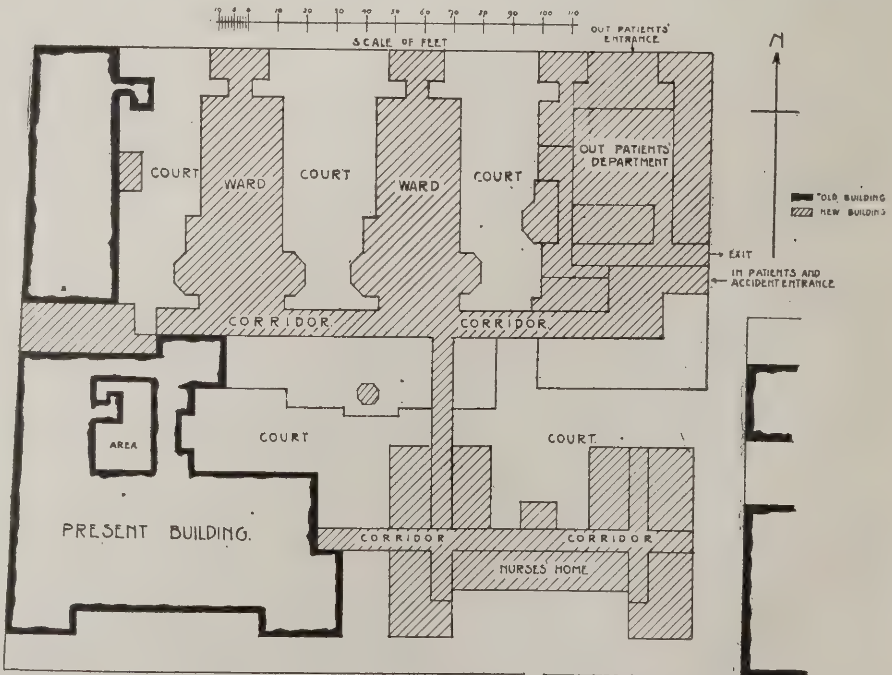
The second premium, £30, has been awarded to Mr. Henry Lord, F.R.I.B.A., of Manchester. In this design the present building has been left alone and the author has evidently considered cost and ample air-space around the wards of most importance. On the smallness of cubical contents this scheme scores, but in the openness of the plan the corridors have been cut down to a minimum, and it is questionable whether the intercommunication between departments on the upper floors could be considered efficient. The plan has many good points to commend it and has been carefully worked out. A neatly-drawn half-inch detail accompanied the elevations, which were the best of the three premiated schemes.

Design Placed Third.

The third premium, £20, has been awarded to Messrs. C. K. and T. C. Mayor, of Manchester. As a whole the plan lacks openness and the space between the wards is very limited, though the general arrangement is good and shows much experience in this class of building. The medical wards have their conveniences, kitchens, &c., well planned, with corridors at the rear connecting the old buildings and the nurses' home to the best advantage for service. All the departments could be more compactly planned, especially the out-patients' and nurses' home, which occupy more space than is necessary. Throughout this scheme the corridors are well lighted and of ample width, with all stairs suitably placed—a point which some competitors did not carefully consider. A number of steps have been omitted on the nurses' connecting corridor to medical wards, as the levels are different. The elevations are economically designed and in keeping with the existing building.



SALFORD ROYAL HOSPITAL EXTENSION: BLOCK PLAN OF SECOND-PREMIATED DESIGN.
H. LORD, F.R.I.B.A., ARCHITECT.



SALFORD ROYAL HOSPITAL EXTENSION: BLOCK PLAN OF THIRD-PREMIATED DESIGN.
C. K. & T. C. MAYOR, ARCHITECTS.

ARCHITECTURAL JOURNALISM.

A lecture on "Architectural Journalism" was delivered by Mr. Maurice B. Adams, F.R.I.B.A., editor of the "Building News," before last Wednesday's meeting of the Northern Architectural Association at Newcastle-on-Tyne. The lecturer disclaimed any attempt at personal reminiscences. As a commencement to his paper he took an abstract proposition : What was the relation of architectural journalism to architecture as a living art, and was the influence of the professional press conducive to its progress or not ? In starting to consider such a proposition it would be well to indulge in a little introspection. The modern architect had been evolved concurrently with the growth of professional journalism; the two had developed side by side. Moreover, they appeared to be inseparable, and certainly acted and reacted each upon the other. Yet the fact had to be acknowledged that the best architecture was erected ages before the days of newspapers or professional architects, and most of it dated long prior to the invention of the printing press. Nevertheless, the annotator of architectural periods fulfilled a useful function, and furnished the architect with one of the best means of education ready to his hand. Whether architecture was recognised as chiefly replete with poetic possibilities, or was treated as a prosaic building business, to be enlivened only by the occasional contentious niceties of professional politics—to whichever side the most importance was attributed, the architect was considerably indebted to the good offices of the journalist. The architectural press, by its means, brought the leaders of the profession into touch with the countless numbers of inarticulate workers, who were thus influenced for the better. We need not stay to find the least common denominator in determining where the evils resulting from the periodicals commenced, or where their possible good might end. That knowledge would be of little use if found. It was far more to the purpose to remember what Professor Armstrong had said in reference to education: "Interest cannot always be maintained at bursting-point; in school, as in the world, uninteresting work must be done sometimes, and, in point of fact, it is most important to acquire the art of doing uninteresting work in a serious and determined way." It would surpass the wit of man to make every number of any serial publication come up to one unvariable standard of excellence, and only where a uniformity of deadly dullness set in could there be just cause for complaint. Further, in criticising the journals, as everybody had a right to do, people so often overlooked the fact that things in which they themselves happened to be particularly interested were the very things which others cared nothing about, and *vice versa*.

There was a class of critic who delighted in saying that the architectural journals only served to make the cribber's repository replete with an ever-increasing choice of patterns, and mostly bad ones at that, because the aforesaid grumblers mostly kept their own precious productions to themselves; thus, on their own showing, they never gave the reader even a chance of seeing how things ought to be done. By continually publishing the best contemporary drawings of the most successful buildings, and in illustrating the designs chosen in current competitions, the professional periodicals served an unquestionable service, to say nothing of the historic examples of all kinds so copiously given as standards for reference, and the reports of meetings, of papers read, reviews, criticisms, news items, and all the innumerable other features of the modern journal.

The lecturer then proceeded to pass in review the architectural and building trade journals that had been started in this country. The oldest was "The Builders' Magazine," issued in 1786, but it only ran through one volume. In 1823 "The Mechanics' Magazine" was published, and about the same date "The Mechanics' Weekly Journal," followed ten years later by "The Architectural Magazine," founded by Loudon (this was the first exclusively architectural paper, and it was interesting to read in it the descriptions of attempts to start architectural societies in London, so that journalism for architects preceded the formation of the societies). The R.I.B.A. was founded in 1834 and its "Transactions" (afterwards the "Journal") were first issued in 1837. The earliest weekly professional paper was "The Civil Engineer and Architect's Journal," published in 1837, price 6d. In 1840 came "The Surveyor, Engineer and Architect," a shilling monthly. In 1843 "The Builder" was first published, and "The Artisan" in the same year. In 1844 Weale's "Quarterly Papers" were begun. Another periodical of the period was "The Architect and Building Operative," which, however, had only a short career under an altered title, "The Architect and Building Gazette." The Great Exhibition of 1851 gave a fillip to things, and amidst all the excitement of wild-cat enterprise a five-shilling "Architectural Quarterly Review" blossomed into being. "The Building News" first appeared in 1855, "The Architect in 1869, "The Irish Builder" in 1870, and "The British Architect" (at first localised to architects in the Midlands) in 1874. The Architectural Association started its own paper, "A.A. Notes," in 1887; the "A.A. Sketch-book" was issued first in 1867. The Society of Architects also had its journal, "The Architect's Magazine." "The Builders' Journal" appeared in 1895, "Building World" about the same date, and "The Architectural Review" shortly after. This practically completed the list.

Our Plate

The illustration of the central portion of the facade of the Galerie des Cerfs which we publish this week is the third in our series of Fontainebleau. It does not call for any special description, as the work is best studied from the illustration. The first of the Fontainebleau plates appeared in our issue for January 23rd, when we also gave a plan of the palace. The second plate appeared in our issue for February 6th.

Sir Aston Webb has been engaged by the Guild of Civic Art of Canada to draw up a plan for the beautification of Toronto.

Architectural Association.—Owing to the great pressure on our space this week we are obliged to hold over Mr. Gerald C. Horsley's paper on architectural training, read before last Friday's meeting of the Architectural Association.

Notes and News

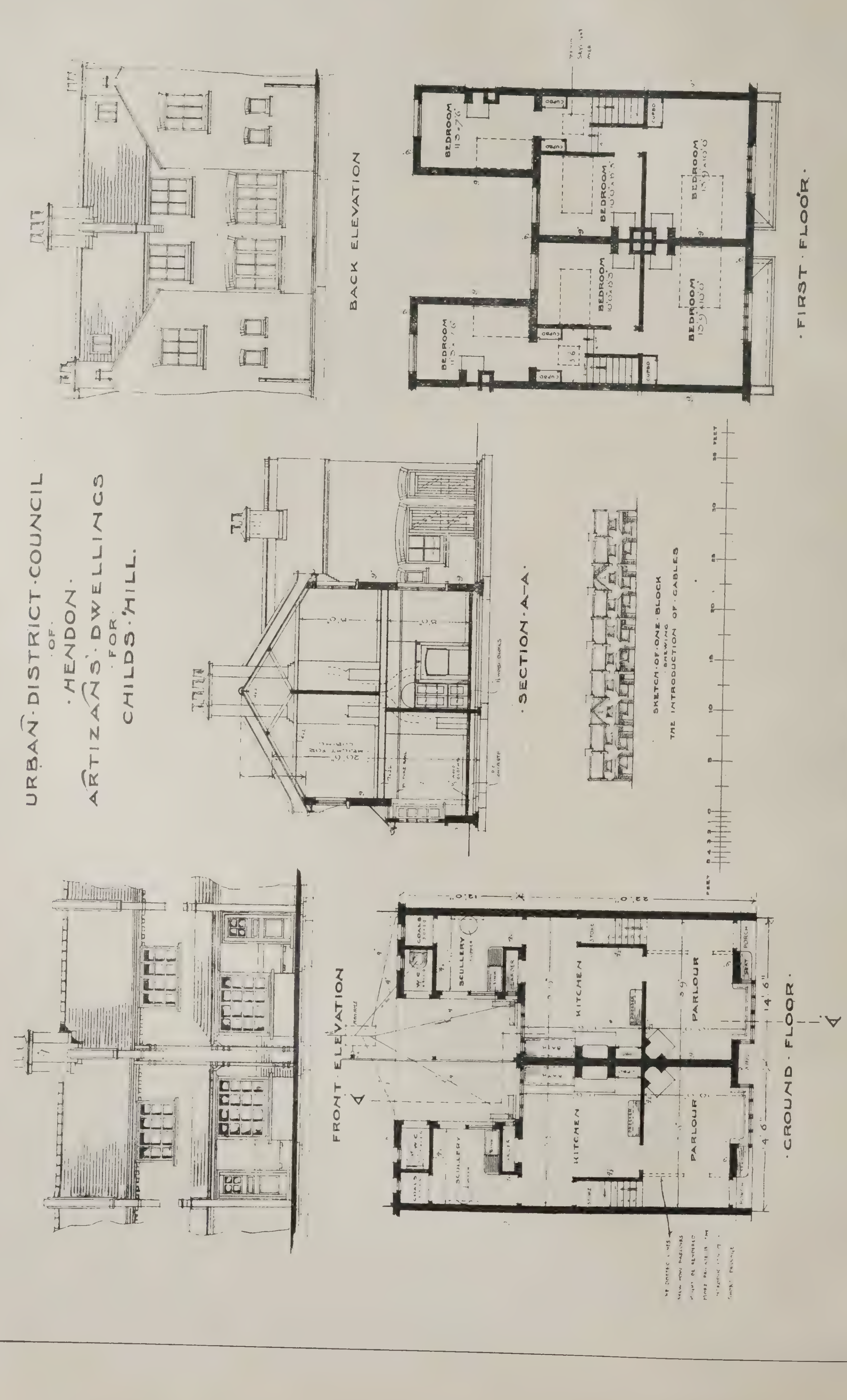
The Proper Treatment of Plasterwork.—In the paper on "The Architectural Treatment of Plasterwork" which he read before the last meeting of the Sheffield Society of Architects and Surveyors, Mr. J. R. Wigfull deprecated the use of undercut ornament, which gave an appearance of weakness or instability, and was totally at variance with the nature of the material. The English form of ceiling of the 16th century, where the surface was covered by a pattern formed by interlacing ribs or ornament in low relief, was the proper method.

Edinburgh Architectural Association.—Mr. J. Stuart Syme read a paper on "The Military Architecture of Medieval Buildings" before last Wednesday's meeting of this Association. The lecturer sketched the progress of the art of fortification from the time of the ancient Britons to the period when the use of cannon rendered the castles inefficient for defensive purposes. It was shown how the castles of the Norman rulers and their successors were developed rather from the primitive moats of both the invading and the subject races, than from the more scientific works of our earlier conquerors, the Romans.

Messrs. A. & F. Manuelle, quarry owners, of Aberdeen, Guernsey, Norway, &c., inform us that they have received numerous communications from friends who appear to be under the impression that they have sold their business. They desire us to reassure all customers and the trade generally that they have no connection whatever, nor ever had, with the business formerly carried on by Mr. C. M. Manuelle, of Fenchurch Street, who for many years represented the Quenast quarries for broken stone, and who has recently sold his business. Messrs. A. & F. Manuelle, of 57, Gracechurch Street, still carry on their well-known business, which has been established for more than 80 years.

English Green Slates.—A most attractive booklet dealing with the varieties of slates produced by the Buttermere Green Slate Co., Ltd., of Keswick (London offices, 52, Queen Victoria Street, E.C.), has been issued. These slates have been used for some of the most important buildings in the kingdom, and they are equally suited to large government or civic buildings as to small domestic properties, as we may gauge from the fact that they are used on the Imperial Institute and also on Mr. Voysey's houses. They are of very pleasing tints. Coloured reproductions of the principal varieties are given in the booklet.

Architects' Estimates formed the subject of a paper which H. Arnold Turner read before the last meeting of the students of the Manchester Society of Architects. The lecturer began by showing what an immense help an accurate method of estimating was to young architects. A very good method for a pupil was to cube out a building which was being designed in the office, price it at a certain figure per ft. cube, and then when the building is finished let him check his cubing with the finished contract. The lecturer also made a very strong point of the question of "rough quantities," and recommended in some cases the putting of a value for so much per yd. super. on the floor areas of the building, and then measuring the floors and multiplying out.



SELECTED DESIGN. GEORGE HORNBLOWER, F.R.I.B.A., ARCHITECT.

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL. *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Bromyard (Herefordshire).—Accepted for the erection of two cottages on the Firs Estate. Mr. Herbert Skryme, architect, 138, Widemarsh Street, Hereford:—

Wm. James, Bromyard	£450

Bury St. Edmunds.—For the erection of a covered grand stand to accommodate about 3,500 persons, and other work in connection therewith, for the Bury St. Edmund's pageant, July 8 to 13, 1907. Mr. Walter D. Harding, A.M.I.C.E., engineer, Town Hall, Bury St. Edmunds:—

J. D. Pitcher & Son, London	£1,906
Scales & Robins, Cambridge	1,900
W. H. Hinkins, Royston	1,850
W. G. Fisk & Co., Ipswich	1,175
H. G. Frost, Bury St. Edmunds ...	1,150
E. Willmott & Sons, Cambridge ...	1,070
Hinnels & Son,* Bury St. Edmunds...	1,050
T. H. Yelf, Lowestoft	1,050

* Accepted.

Llandaff.—For the erection of a gymnasium, library, and other additions to school buildings, for the Committee of the Howell's Glamorgan County School for Girls, Llandaff. Mr. G. E. Halliday, F.R.I.B.A., architect, 19, Castle Street, Cardiff:—

W. Williams, Cardiff	£2,090	0	0
Gibbon & Sons, Cardiff	2,000	0	0
Knox & Wells, Roath	2,000	0	0
W. Cox, Llandaff	1,997	10	0
F. Bond, Cardiff	1,994	0	0
J. Gibson & Sons, Cardiff	1,890	0	0
G. Beams, Cardiff	1,887	0	0
J. Allen & Sons, Cardiff	1,884	16	4
D. Davies & Sons, Cardiff... ...	1,880	0	0
C. C. Dunn, Cardiff	1,863	7	4
Cox & Bardo, Cardiff	1,812	14	2
Hallet, Cardiff	1,800	0	0
Blacker Bros., Cardiff	1,799	14	6
E. Turner & Sons, Cardiff... ...	1,798	0	0

London, N.—For the construction of new cells and alterations at police station, Edmonton. Mr. J. Dixon Butler, F.R.I.B.A., surveyor to the Metropolitan Police, New Scotland Yard, S.W. Quantities by Messrs. Thurgood, Son & Chidgey, Charing Cross Chambers, Duke Street, Adelphi:—

Spiers & Son	£2,490
Higgs & Hill, ...	2,374
Grover & Son	2,346
Holloway Bros.	2,319
Stapleton & Son	2,239
W. Eyre	2,235
C. Ansell	2,217
Willmott & Sons	2,191
Lathey Bros.	2,190
Lawrance & Sons	2,184
Fairhead & Son	2,179
Lascelles & Co.	2,165
A. Monk	2,072

London, N.W.—For the erection of a receiving home for children, Acton Lane, N.W., for the Guardians. Mr. A. Saxon Snell, F.R.I.B.A., architect, 22, Southampton Buildings, Chancery Lane, W.C. Quantities by Mr. H. Bushell:—

Treasure & Son	£3,755
Abbot & Charlton	2,935
Holliday & Greenwood	2,819
A. Roberts & Co.	2,790
F. Webster & Son	2,649
Hyde & Co.	2,639
Patman & Fotheringham	2,639
Spencer, Santo & Co.	2,580
Cowley & Drake	2,537
F. & E. Davey	2,537
W. Lawrence & Sons	2,424
W. L. Cook	2,387
E. J. Clayton	2,365
Wisdom Bros.,* Isleworth	2,330

* Accepted.

London, E.C.—For the reconstruction on the conduit system of electric traction of the existing horse tramways in Goswell Road, Pentonville Road and Gray's Inn Road, and the construction, on the same system of traction, of new lines in St. John Street, for the London County Council:—

Fry Brothers, London	£73,028	7	8
J. Mowlem & Co., Ltd., London	70,893	0	0
W. Griffiths & Co., Ltd., London	69,832	8	6
J. G. White & Co., Ltd., London	65,675	12	0
W. Manders, Leyton	63,999	13	7
Dick, Kerr & Co., Ltd., London	60,945	11	7
R. W. Blackwell & Co., Ltd.,* London	60,059	19	7

* Recommended for acceptance.
(Chief Engineer's estimate, £67,728 13s. 2d.)

London, W.—For electric lighting, &c., of Section "A" (art block) of the L.C.C. Hammersmith Technical Institute:—

Blackburn, Starling & Co., Nottingham	£2,639	0	0
J. E. Spagnoletti & Co.	2,195	0	0
R. Brightwell	2,185	0	0
Army & Navy Auxiliary Co-operative Supply, Ltd.	2,184	0	0
J. O. Grant & Taylor	1,914	0	0
Seth Brothers	1,705	0	0
Wippell Brothers & Row, Exeter	1,700	0	0
Higgins & Griffiths, Ltd.	1,650	0	0
F. A. Glover & Co., Ltd.	1,626	0	0
W. J. Fryer & Co., Ltd.	1,550	0	0
S. G. Cozens	1,484	0	0
Sweet Brothers	1,465	0	0
A. W. Penrose & Co.	£1,460	0	0
W. Barton & Sons, Edinburgh	1,420	0	0
Smeeton & Page,* 63, Queen Victoria Street	1,368	5	0

* Recommended for acceptance.
(Rest of London.)

Newport.—For the erection of new offices and extension to warehouses in Llanarth Street, for T. H. Howell, Esq., J.P. Mr. Alfred Swash, F.R.I.B.A., architect, Midland Bank Chambers, Newport, Mon. Quantities by architect:—

E. F. King & Co.	£3,049
W. Jones & Son	2,956
R. W. Moon	2,945
J. Matthias	2,653
C. H. Reed	2,636
J. Charles	2,625
J. Jenkins & Co., Ltd.*	2,470

* Accepted.
All of Newport.

Current Market Prices.

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	106	10	0	107	0	0
Do. Strong sheets ...	do.	123	0	0	124	0	0
Lead, soft foreign... ...	do.	19	10	0	19	12	6
Do. English	do.	19	15	0	20	0	0
Do. pipes...	do.	23	2	6	23	5	0
Do. sheets	do.	22	12	6	22	15	0
Galvanised Corrugated sheets	do.	14	0	0	14	2	6
Spelter G. M.	do.	25	17	6	26	0	0
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	7	17	6	8	0	0
Marked bars, Staffs. ...	do.	9	0	0	9	2	6
Common bars, do. ...	do.	7	7	6	7	10	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	17	6	7	0	0
Angles, Midlands	do.	7	2	6	7	5	0
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	9	6	7	11	0
Tees do. do. do.	do.	7	10	0	7	12	6
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	191	0	0	191	10	0
Do. English ingots ...	do.	194	0	0	195	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

Deals, Archangel, Yellow, 2nd, 3×9	per std.	15	0	0	15	10	0
Do. do. do. do. 3×8	do.	13	0	0	13	5	0
Do. do. do. 3rd, 2½×9	do.	11	0	0		—	
Do. do. do. do. 2½×7	do.	10	0	0		—	
Do. do White, 2nd, 3×9	do.	9	15	0		—	
Do. Altappen, Yellow, 2nd, 3×9	do.	9	0	0		—	
Do. Narva, Mixed Yellow, 2½×7	do.	9	10	0		—	
Do. Nederkalix, Yellow, 1st, 3×9	do.	11	10	0	11	15	0
Do. Ornskijoldsvik, Yellow & White, 3×9	do.	4	5	0		—	
Do. Quebec, Spruce, 2nd, 3×9	do.	10	0	0		—	
Do. do. do., unsorted, 3×9	do.	9	10	0	9	15	0
Do. St. Petersburg, Yellow, 1st, 2½×7	do.	11	5	0		—	
Do. St. John, Bright Spruce, 1st, 2nd, 3rd & unsorted, 3×7	do.	8	0	0		—	
Do. Riga, White, unsorted, 2½×7	do.	6	10	0	7	10	0
Battens, Archangel, Yellow, 2nd, 2×11	do.	16	10	0	16	5	0
Do. do. do. 3rd, 2×11	do.	10	15	0		—	
Do. Ingramport, White, unsorted, 2×6	do.	6	10	0		—	
Do. Kallskar, Yellow, 4th, 2×7	do.	10	0	0		—	
Do. Narva, Mixed Yellow, 2×8	do.	9	10	0		—	
Do. do. do. 2×7	do.	9	5	0		—	
Do. do. do. 2×6	do.	8	10	0		—	
Do. Riga, White, 4th, 2×7	do.	7	0	0		—	
Do. do. do. do. 2×6	do.	6	10	0		—	
Do. do., Yellow, unsorted, 2×8	do.	9	5	0		—	
Do. Skelleftea, Yellow, 2nd, 2×9	do.	10	15	0		—	
Flooring Boards, Fredrikstad, Yellow, 3rd, 1×7	do.	0	9	9		—	
Do. do. Mixed Yellow, 1×6½	do.	0	9	6		—	
Do. Gefle, Yellow, 3rd, 1¼×7	do.	0	11	6		—	
Do. do. do. do. 1¼×6	do.	0	11	3		—	
Do. do. do. do. 1×7	do.	0	10	6		—	
Do. Mon, Yellow, 1st, 1×7	do.	0	13	0		—	
Do. do. do. 2nd, 1¼×5	do.	0	13	0		—	
Do. do. do. do. 1×7	do.	0	12	0		—	
Do. do. do. do. 1×6½	do.	0	11	0		—	
Do. do. do. do. 1×6	do.	0	11	3		—	
Do. do. do. do. 1×5	do.	0	9	6	0	9	9
Do. do. do. 3rd, 1¼×7	do.	0	12	9		—	
Do. do. do. do. 1×7	do.	0	10	9		—	
Do. do. do. unsorted, 1×4	do.	0	9	0		—	
Do. do., White, do., 1×7	do.	0	10	6		—	

ARCHITECTURAL DIS-ORDERS COMPETITION.

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The competition is divided into two parts—the first appealing mostly to students and practitioners of architecture and the second more especially to those practically engaged in constructional work. The most valuable prize will be given for the highest number of correct solutions of all the pictures in both divisions, but the rest of the prizes will be allocated to two classes, so that every reader will stand a chance of winning a prize.

As regards division A (architecture) we would call attention to the fact that a number of the questions will directly relate to the Orders of architecture, these being wrongly drawn in some way or other: and in solving these questions it will be found very useful to refer to the series of articles published recently in our columns under the title of "Practical Notes for Architectural Draughtsmen," by Messrs. Alfred W. S. Cross and Alan E. Munby, which series is being separately published as plates for use on the drawing-board.

The pictures in the "Architectural Dis-Orders Competition" will be published each week for 26 weeks in THE BUILDERS' JOURNAL, the first, second and third sets having been given in the issues for February 6th, 13th and 20th respectively, and the fourth set in this issue.

Competitors may send in as many sets of solutions as they please, provided they are in accordance with the conditions.

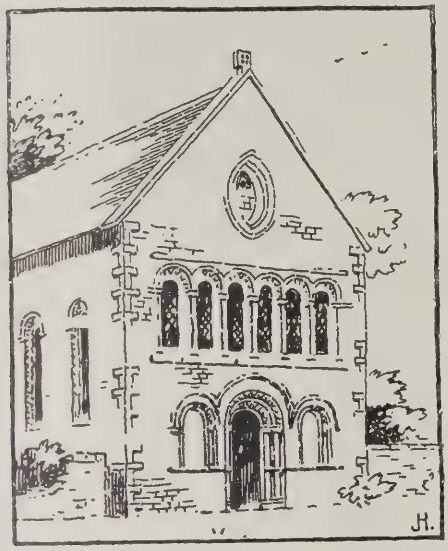
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Fourth Series.)

CLASS A (ARCHITECTURE).



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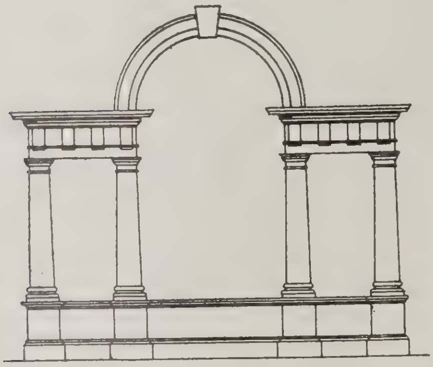

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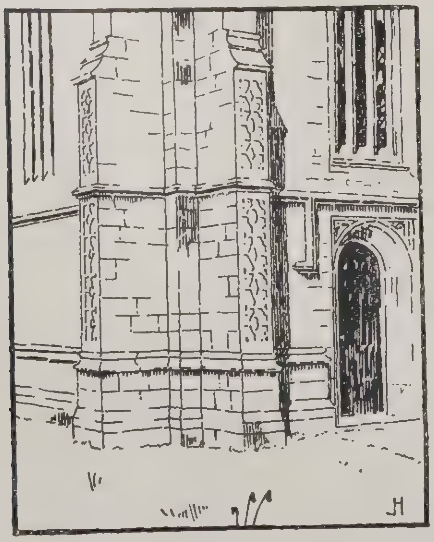


A 12

THE PRIZES.

£20, and 50 other valuable prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions to the question "What is wrong?" in relation to each of the drawings published in the "Architectural Dis-Orders Competition." The winner, or winners, of this special prize will not be eligible for any of the other prizes offered.

The remainder of the prizes are divided into two classes, as follows :—

Class A (Architecture.

1st Prize.—£10.

2nd Prize.—Morocco leather pocket case of German silver instruments, comprising 5-in. sector-jointed compass, with double knee-joints, hair spring attached to the divider leg of compass, nut and bolt needle points, pen and pencil legs, lengthening bar, set of three spring bows, ruling pen.

3rd Prize.—Leather case of instruments, containing 4-in. German silver bow compass, hinged pen and pencil points, needle or lead holder, and handle to take pen or pencil leg.

4th Prize.—Leather case of beam compasses, with tangent screw adjustment, and needle points (electrum).

5th Prize.—Architect's pine drawing board, grooved, with mahogany battens, brass slots and screws to allow of contraction. One edge inlaid with ebony. Size 28ins. by 21ins.

6th Prize.—A morocco pocket case containing an English set of three spring bows, with steel heads and steel points (divider, pen and pencil).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case containing 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

9th Prize.—A brass proportional compass, 6-in., partly divided.

10th Prize.—A pocket divider, electrum.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

Class B (Building).

1st Prize.—£10.

2nd Prize.—Abney level in morocco case, with 5-in. rack and vernier.

3rd Prize.—Best English-made electrum *Napier* pocket compass.

4th Prize.—A drawing set, comprising drawing-board (size 23ins. by 16ins.), 24-in. T-square, 2 large set-squares, and set of instruments in rosewood case, comprising 4-in. brass divider, needle-pointed compass with pen and pencil points, bar, patent pencil point, slip rule, &c.

5th Prize.—A pair of builder's rods, spring-jointed.

6th Prize.—A pair of builder's rods (not jointed).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, contining 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, and 6-in. diagonal scale.

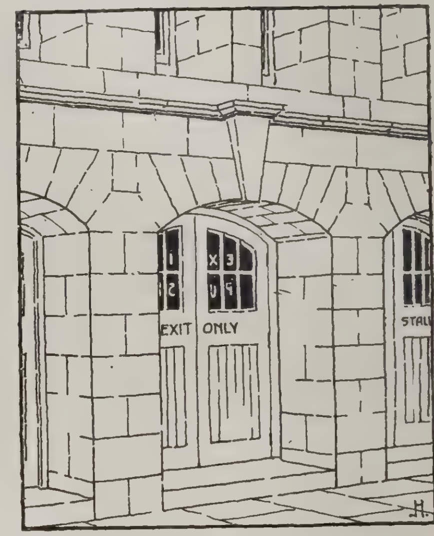
9th Prize.—Spirit level, 15ins., brass-faced.

10th Prize.—2-ft. fold-up boxwood rule, brass-jointed, fully divided, 4 bevels.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

(For Coupons see page XXX.)

CLASS B (BUILDING).



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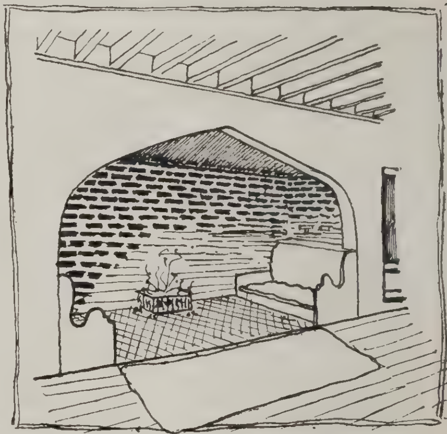

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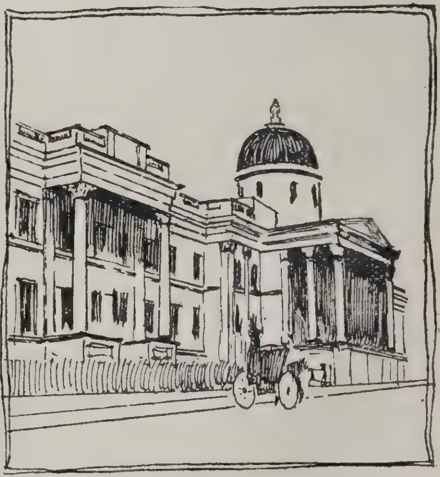

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*Copies of "*The Builders' Journal*" in which the first, second and third series of pictures appeared can now be obtained from the Publisher. The dates of the issues are February 6th, February 13th and February 20th respectively.*

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Supplement to
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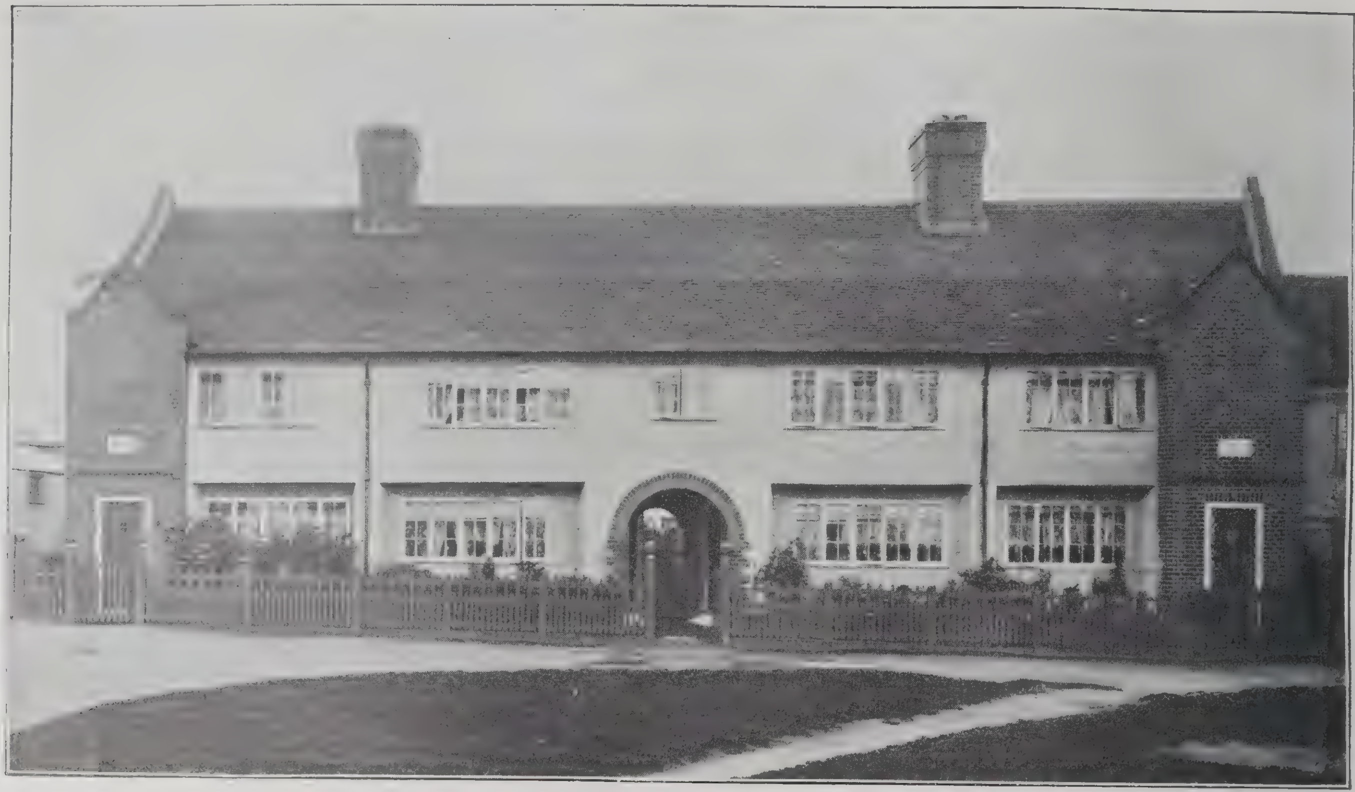
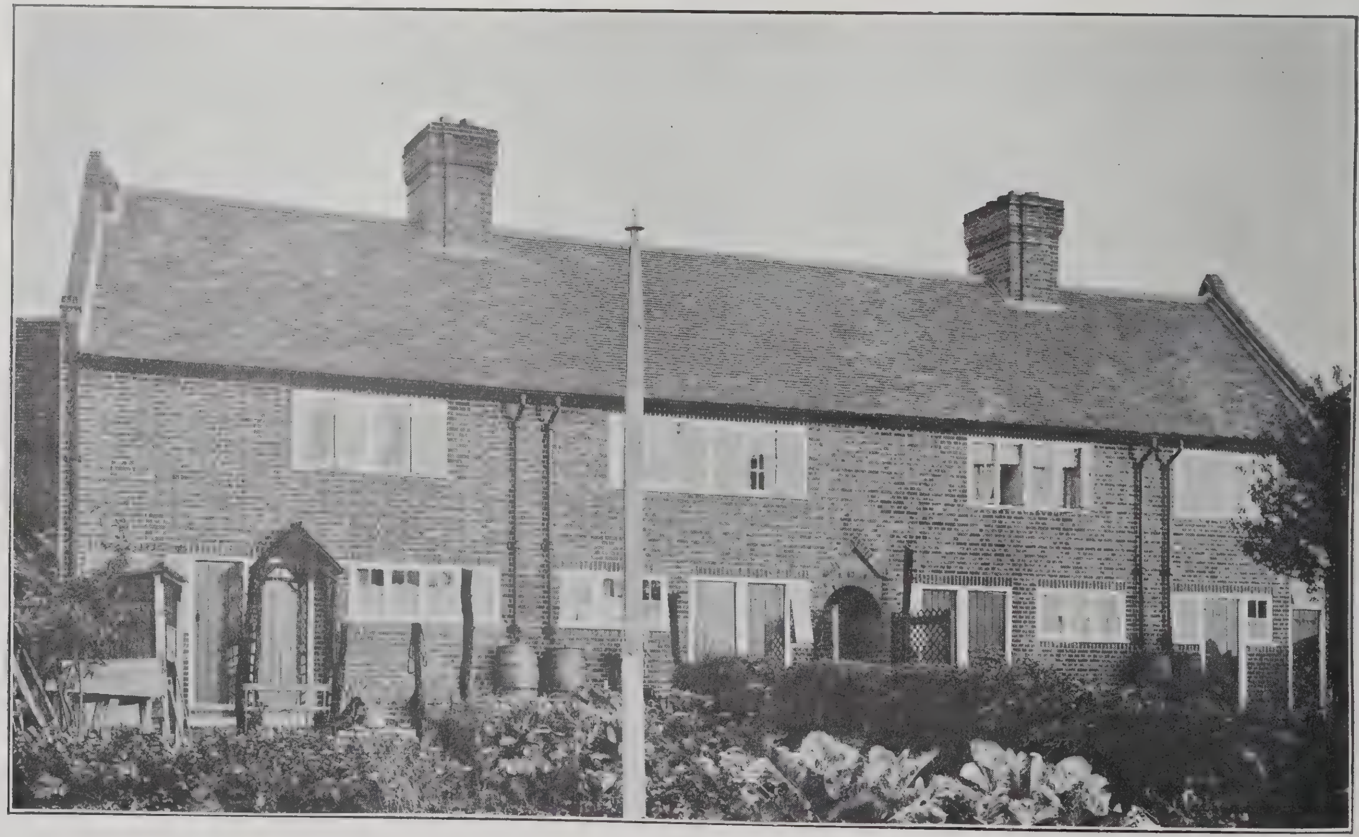
Wednesday, March 6th, 1907.



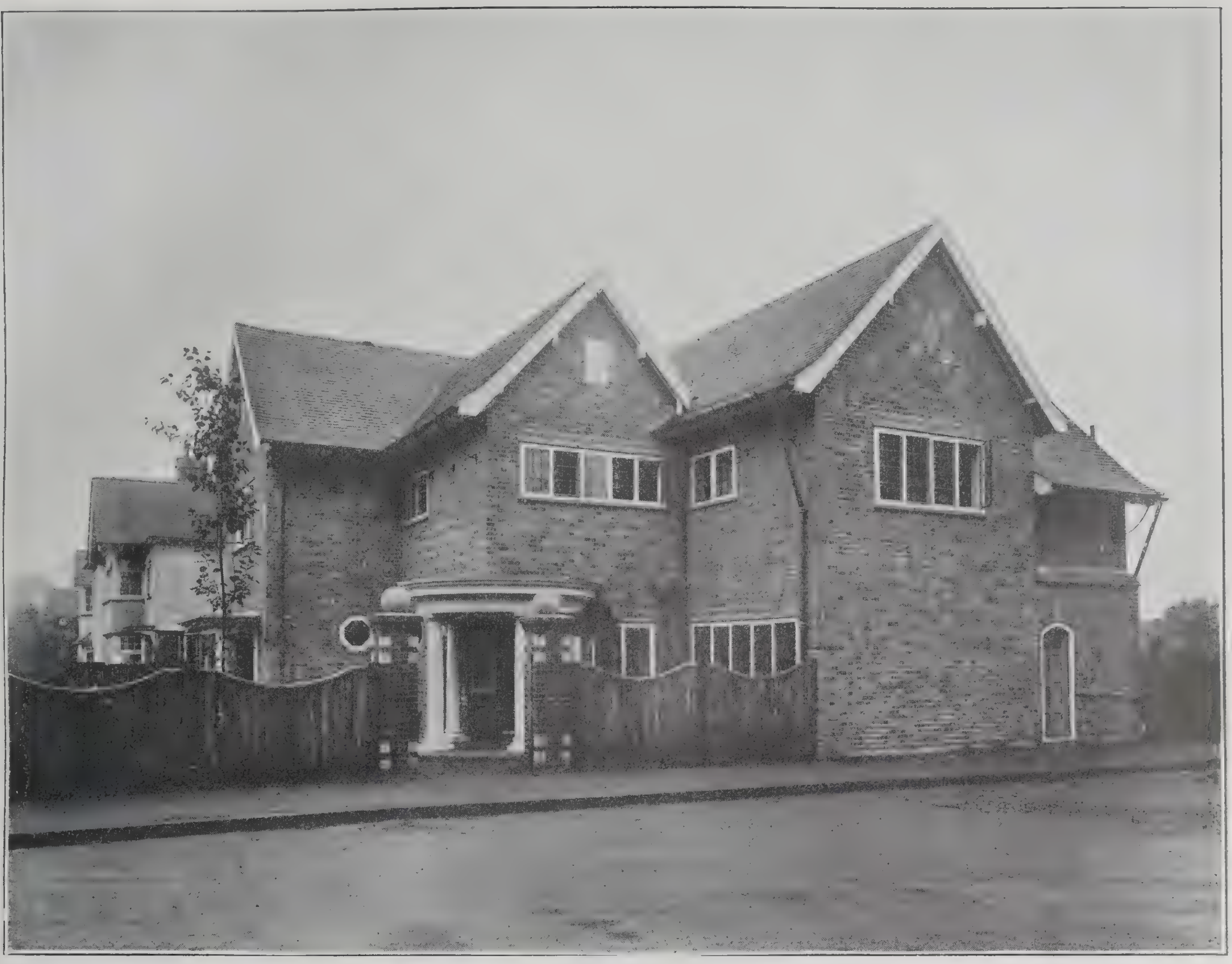
Front View.



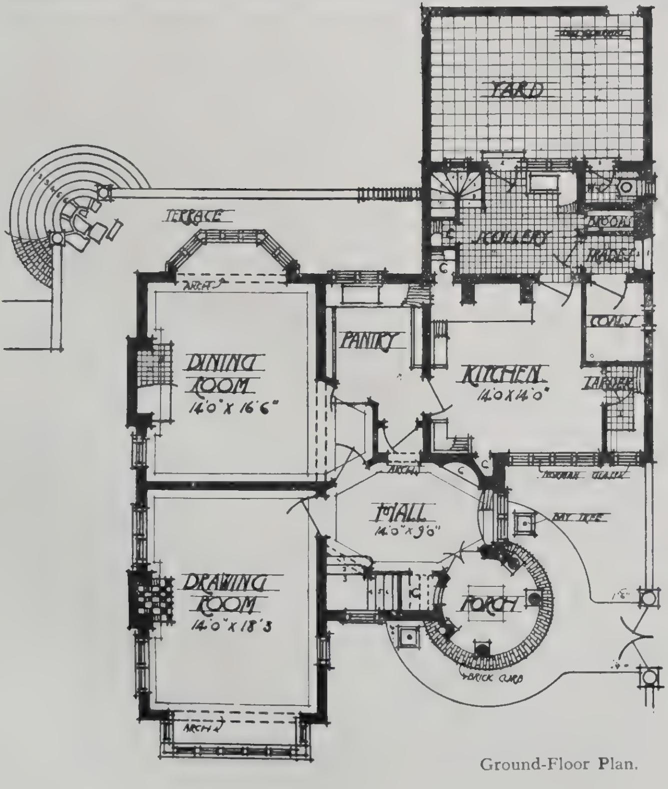
Back View.

COTTAGES AT SOUTH MIMMS, HERTS. GEOFFRY LUCAS, A.R.I.B.A., ARCHITECT.

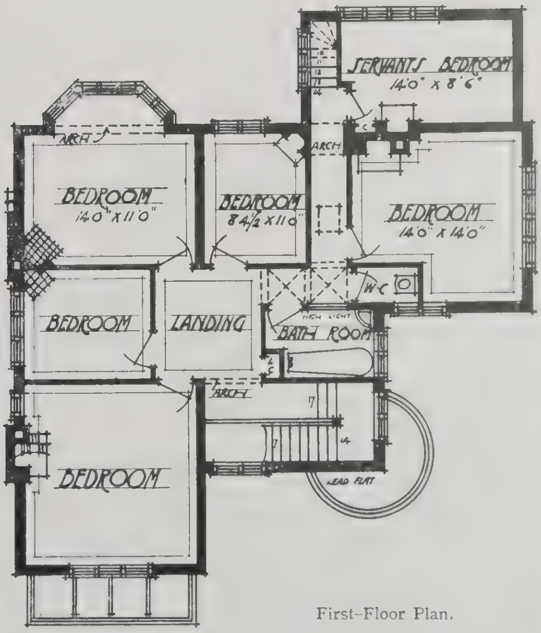
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, March 6th, 1907.



HOUSE AT SURBITON.
A. JESSOP HARDWICK, F.R.I.B.A., ARCHITECT.



Ground-Floor Plan.



First-Floor Plan.

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March 6, 1907. Volume 25, No. 630

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

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The Presentation Key. THE opening of the new Central Criminal Court last week afforded another illustration of the waste of money and labour which is unfortunately associated with "the presentation key." In this particular case the futility of the practice was accentuated because the key was a veritable *tour de force* of the Goldsmiths' and Silversmiths' Company, being of gold studded with diamonds, sapphires, rubies and emeralds, and set with the royal crown, arms and cipher, the arms of the City, and the arms of Justice. We have no idea of the cost of it, but it can be nothing more than a bauble, and it will simply go to join that innumerable collection of similar things which it is the custom to inflict on Royalty when buildings are being officially opened by them. An ordinary key, perhaps gilt, would be quite sufficient. The sooner the foolish practice of having a glorious "presentation key" goes out of vogue we think the better it will be for everybody concerned, especially for the architect, as it often devolves on him to provide this needless extravagance.

Shops on the Bridges. MR. COLLCUTT, we see, is credited with a scheme for having shops on either side of the reconstructed Southwark Bridge. It will be remembered that in his recent presidential address to the Institute Mr. Collcutt put forward a modification of the same scheme in the way of covered walks across the bridges of London, a proposal which, we think, would be of the greatest benefit if carried out. The shop scheme, of course, is much more elaborate. Old London Bridge, with its houses on either side, is at once recalled to memory, and we are reminded that people were thus attracted to go over the river because there was an easy method of getting across. "Shakespeare would hardly have built the Globe Theatre in Southwark if his patrons had had to face the discomforts of an open bridge." In Mr. Collcutt's scheme there would be 80 shops arranged on either side of the bridge, with openings between, through which glimpses of the river might be obtained. It is estimated that the bridge would not require to be more than 134ft. wide, the roadway being the same as Northumberland Avenue. We have not the faintest belief that this scheme will be carried out, but we think if the idea of having some sort of covered ways across the Thames bridges is kept periodically before the public, and the idea hammered in, the proposal will eventually be carried out. The proposal presents many difficulties, but we think these could be successfully overcome by an architect of ability acting with an engineer of talent and experience.

New, True, or Neither

In his "Westminster Abbey and the King's Craftsmen," lately published, Professor Lethaby urges that the Abbey should be treated with lime-wash inside. "I do not doubt," he says "that a thin skin of lime would give a satisfactory sense of wholeness and fairness which would immensely amend the disagreeable and sophisticated look of the present smoke-attacked stone." I can vouch for the unerring instincts of the accomplished antiquary in this matter, as I have just had my scullery done out. But in any case, Professor Lethaby's scheme would earn for him the gratitude of thousands, and add enormously to the popularity of our national monument, as his "immense amendment" would make it possible for visitors to write their names on the walls. We must not forget, however, that there might be inscriptions as well, not entirely appropriate to the place or the occasion. There was a certain visitor to one of our cathedrals, who, after writing his name on the wall, added some graceful verses of his own composition. When he returned to the building some years later he found that an abandoned wretch had written below:—

It is not every man that can be a Poet,
No more than every sheep can be a Goet.

* * *

It was an American visitor who, in revenge for disappointment of his ambition to record his name on the Abbey walls, caused the death of two vergers by persistent demands to be shown the tomb of Skitepoke—"the late Mr. Skitepoke," as he called him. He said he had travelled from N'York to see the burial-place of Skitepoke and was not going to be put off with excuses. He expressed surprise at the ignorance of the vergers. In America, he asserted, every child was taught to respect the memory of the poet Skitepoke; they called him "the Bard of Heaven," knew all about his tomb in Westminster Abbey, and knew his plays by heart, "The Merchant of Venus" and "The Bells."

* * *

From an assortment of samples of school children's essays I learn that "Rameses II. is generally known as the Pharaoh of the Compression: because he made the Children of Israel into bricks without straw." "The Temple of Zeus is built of columns that bulge out. This is called the Ironic style." I have seen some of those columns, but won't mention names. I leave the reader to think about it, and also to ponder over the statement that "The Parthenon was modelled on St. George's Hall, Liverpool."

* * *

The choicest of answers, however, come under the mathematics section. Here they are:—"A circle is a line of no depth running round and round a dot for ever." "A theorem is something you have to prove which is absurd." "A problem is something that we've proved, and then we've got to find out what it's about." "A problem is a figure which you do things with, which are absurd, and then prove it." "When holes are added to whole the remainder is holes."

THE LOOKER-ON.

HENSHAW'S BLIND ASYLUM SCHOOL COMPETITION.

The Board of Management of this well-known charity school recently invited competitive designs from architects practising in Manchester or members of the local Architectural Society. About 30 designs were ultimately adjudicated upon by Mr. John Holden, F.R.I.B.A., of Manchester. His award has not met with the approval of the competing architects, and the Governors of the school have also discarded the assessor's award and selected a design which was not premiated. The Board claim that their knowledge of the requirements of the institution led them to this conclusion, and that the plans best suited to their needs were those of Messrs. Mangnall and Littlewood, though they regretted they could not fall in with the views and judgment of the assessor. The consensus of opinion is that the Board were fully justified in what seems a high-handed action, and local architects are agreed that fortunately one of the best designs has been finally selected by the Governors. In departing from the assessor's award the Board of Management leave themselves open to public censure, and although in the present case the result is satisfactory, this is not to be taken as a precedent by promoters of other competitions.

Site and Conditions.

The site for the proposed building is in the neighbourhood of the present asylum and comprises extensive grounds containing an old house known as Hayesleigh," which has been purchased by the Board of Management to meet the growing demands on the institution and to provide better residential accommodation for boys and girls, while retaining the present asylum for the use of adults only.

At an early stage in the competition the assessor appears to have been appointed, and the conditions were most carefully detailed—the areas and positions of the rooms and departments in quite a needless manner, which has resulted in the assessor awarding premiums to plans which are almost all at variance with the wording, meaning and natural interpretation of the conditions issued to architects, and the acceptance of a scheme by the Board which closely follows every detail asked for, including the positions of the rooms; it is, in fact, the most satisfactory set of plans submitted, according to the strict conditions of the competition.

The accommodation asked for did not lend itself to a balanced plan. The number of scholars to be provided for worked out to 85 boys and 65 girls, with recreation rooms and dormitories and isolation wards, also bedrooms for 15 servants and about the same number of officers' and residential quarters for the matron and schoolmaster.

On the ground floor, connected to the administrative building by covered corridors, was the school building, with central hall and twelve classrooms—15 scholars in each teaching room—and the cloaks and conveniences all in accordance with the Board of Education rules.

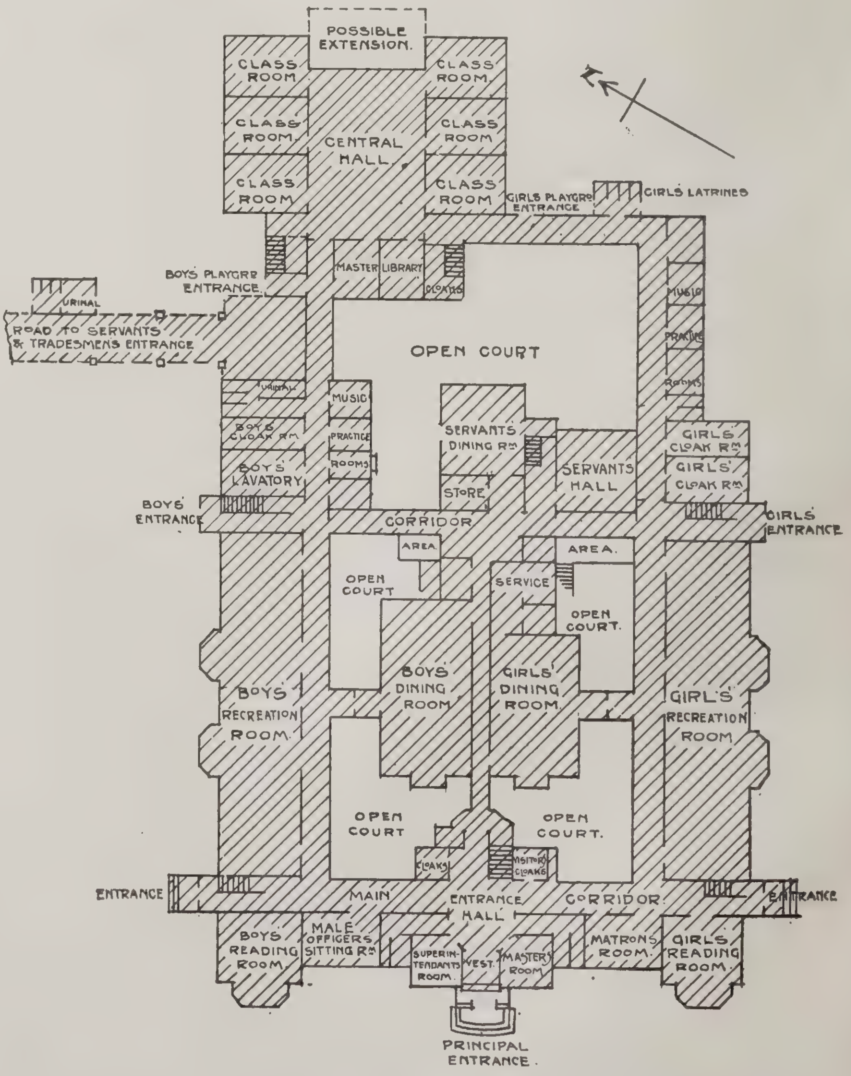
The conditions stated that the existing old house could be utilised to form part of the proposed building or not, and that in any case it was not the intention of the Board to pull the building down at present. As the old residence is in a very dilapidated condition, with rooms only 9ft. high and almost level with the outside grounds, it is questionable whether it is worth while utilising this building, as the cost of improving and bringing the structure up to modern requirements will prove an expensive item. Had the Board agreed to sweep this old structure away, the competition would have been more successful.

The Accepted Design.

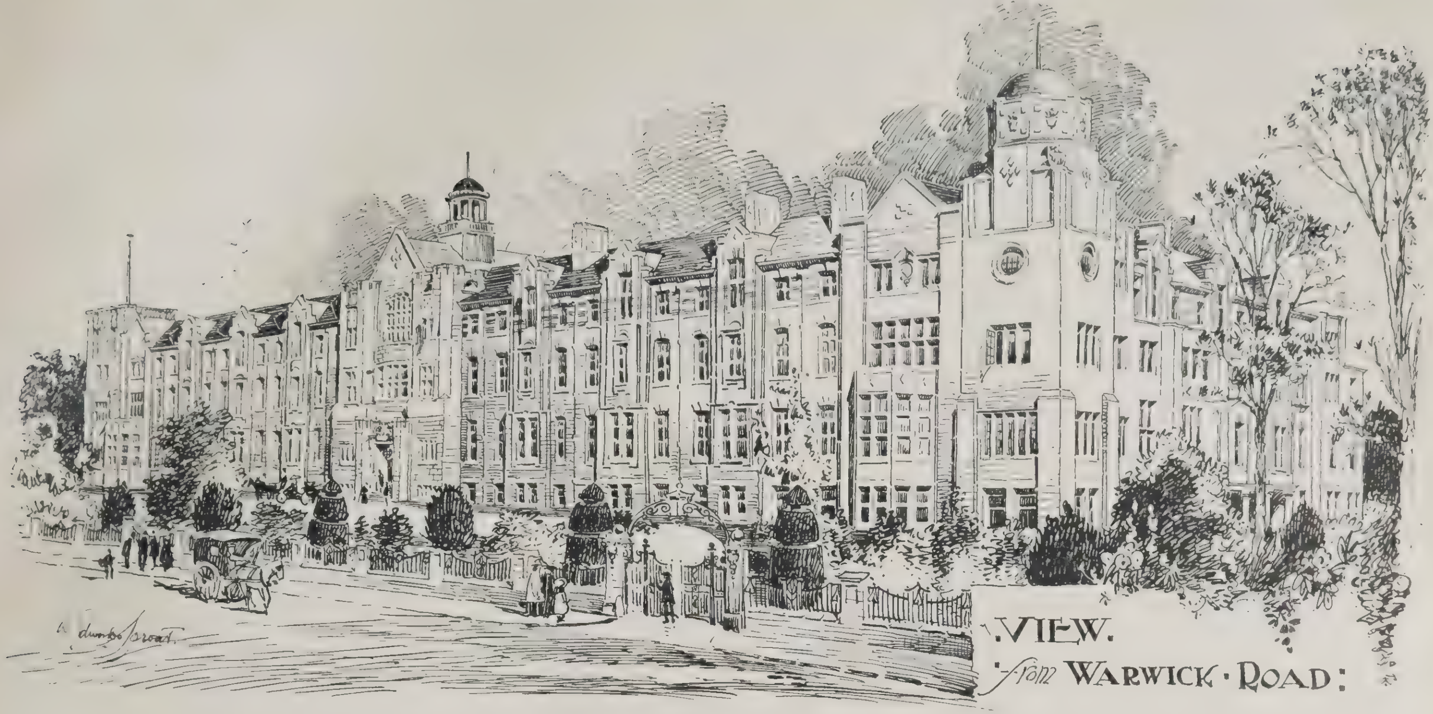
This has been submitted by Messrs. Mangnall and Littlewood, of Manchester, and was selected and approved by the Governors at their last meeting. It was then stated that the entire scheme will cost about £40,000 to bring the work in every respect to the level of the best blind institutions in the country, but the cost of the building itself will be about £26,000, exclusive of furnishing. The accepted plans show evidence of much thought and study in the arrangement of the rooms and cleverly utilise the existing house to the best advantage. The grounds, which are well wooded and picturesquely laid out, have not been interfered with, although every competitor rearranged the land to suit his plans. Another important point in favour of this scheme is the position of the new building on the site. It has been placed as near the road as possible, so as to leave the remainder of the ground for the use of the inmates, either as playing fields or as recreation grounds. This arrangement has evidently strongly influenced the Board in accepting the design, as nothing would be gained by laying out the land for the benefit of the public gaze—as the site adjoins a side road with no traffic thereon—and the inmates of this institution spend all their time either in the building or in the grounds. The accompanying plan is self-explanatory. The want of balance is due entirely to the peculiar conditions of the competition, which had little regard for equal areas in the various rooms asked for. In the basement, which is situated on the south side of the main front and follows the slope of the land, technical rooms for typewriting, bent ironwork, chair-seating, basket work and woodwork, also meat stores and girls' latrines are placed.

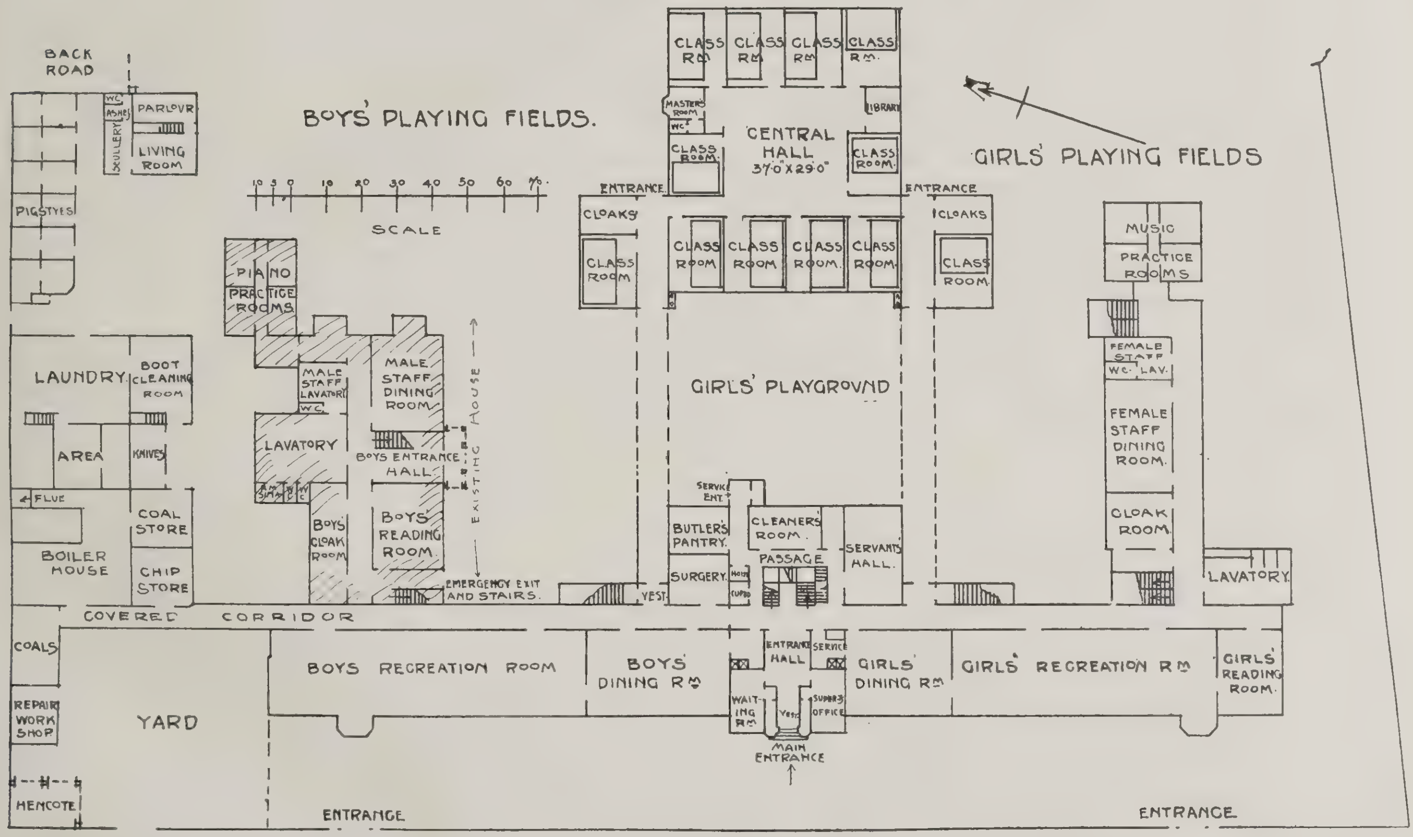
The first-floor plan is chiefly occupied by dormitories for boys and girls, with officers' cubicles adjoining for inspection and supervision. Cross-ventilation and efficient lighting have been secured to the sleeping apartments by purposely omitting to carry up the ground-floor main corridor. Another noticeable and commendable feature shown throughout this set of plans is the disconnecting of the sanitary conveniences from the residential building, and the separation of the rooms devoted to the boys from those set apart for the girls.

On the second floor are dormitories, sick wards, conveniences, also kitchen, scullery, &c., in the centre of the administrative building, as well as servants'



HENSHAW'S BLIND ASYLUM SCHOOL, MANCHESTER: FIRST-PREMIATED DESIGN.
C. K. & T. C. MAYOR, ARCHITECTS.





Ground-Floor Plan.

HENSHAW'S BLIND ASYLUM SCHOOL, MANCHESTER: SELECTED DESIGN. MANGNALL AND LITTLEWOOD, ARCHITECTS.

cubicles, officers' bedrooms and linen stores. The sick wards might have been isolated with advantage and cut off from the rest of the building by a direct blow-through passage, but the elevations have been given the preference; it is doubtful whether infectious cases would be permitted to remain in the sick wards. The elevations are reminiscent of a recent sanatorium in their simplicity and treatment. The style lends itself to an institution of this kind. All the drawings were well finished, including a ½-inch detail, and an excellent perspective in monotint.

Design placed First.

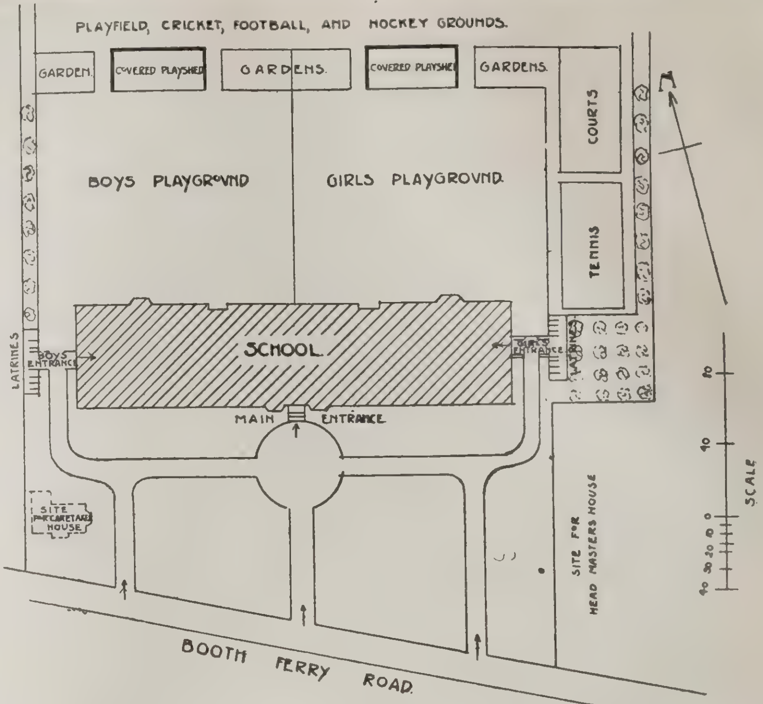
This position, with the premium of £100, was awarded by the assessor to Messrs. C. K. and T. C. Mayor, of Manchester. A glance at the accompanying block plan shows that this scheme practically covers three-parts of the site; it has five internal areas and a series of connecting corridors that exceed every other design in length, and would be a drawback to the blind children in finding their way about the building. Another objectionable feature is the position of the boys' quarters, which practically face north. Three of the classrooms in the school building also have a north aspect, and no supervision is given to the playgrounds for either boys or girls. The headmaster's room looks into a court and the male officers' sitting-room adjoins the public road. The service arrangement of the boys' dining hall is insufficient, being reached from across the servants' corridor, which is only 4ft. wide and not well lighted. Another drawback to this scheme is the number of swing doors scattered throughout the corridors, particularly between recreation-, reading- and dining-rooms, which should be cut down to a minimum for blind children; and it is preferable that doors sliding into a recess should be used instead of swing doors. The servants' quarters are another serious feature in this scheme, notably on the ground floor, where the boys' corridor has to be used as a connecting way between kitchens and the covered road to servants' and tradesmen's entrance. The boys' conveniences adjoin this corridor and are very badly placed. The elevations look heavy, though dignified. The building cubes out very large, despite the fact that economy for a charitable institution was insisted upon; this should have had more weight with the assessor in making his award.

Design placed Second.

The second premium (£50) has been allotted to Mr. Henry Lord, of Manchester. In this scheme the existing house has been removed and an entirely new building shown in the centre of the site, with the school at the rear. This was one of the best arranged plans on exhibition, and superior to the first-premiated. But the disregard of the conditions displayed in the design has caused much comment among competitors who conscientiously adhered to all the required stipulations, although prejudical to a balanced plan.

Design placed Third.

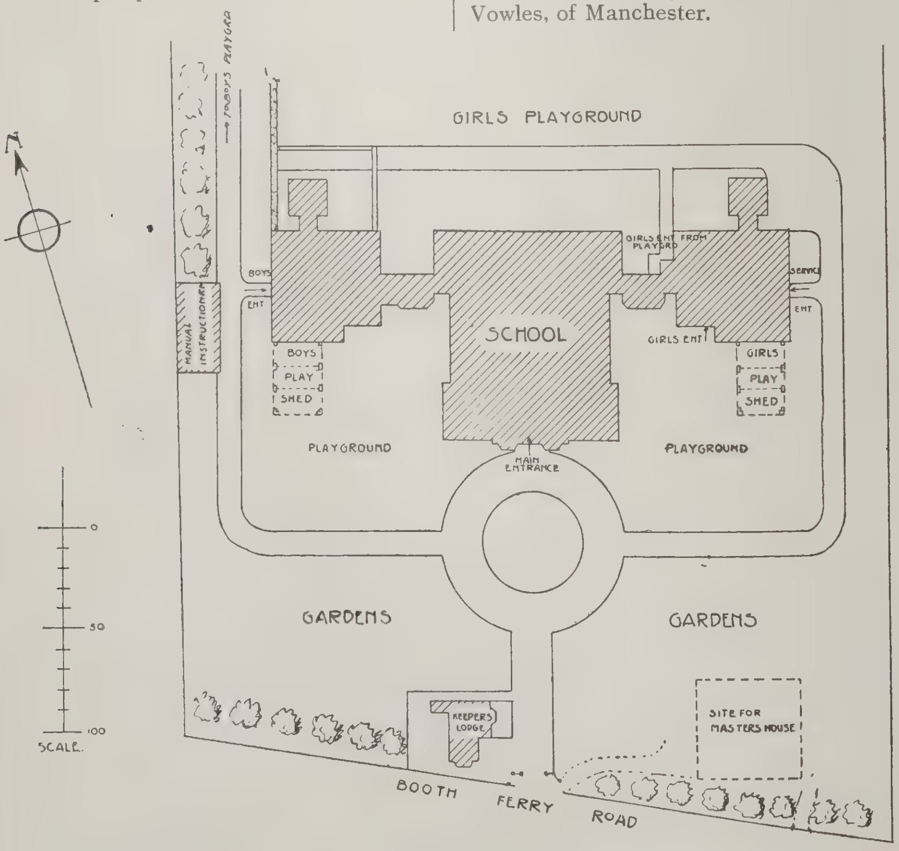
The third premium (£25) has been awarded to Mr. G. H. Willoughby, for a vigorous scheme, well illustrated. The arrangement of the departments is similar to that of the second-premiated design, though not so thoroughly worked out, as six classrooms are lighted from an internal court, and the balance of the plan is upset by too faithful an adherence to the scheduled areas of the competition conditions. The second floor is a maze of rooms and corridors; evidently it was hurriedly planned. Well-designed elevations accompany this set, also a delicately rendered perspective view.



SECONDARY SCHOOL, GOOLE: BLOCK PLAN OF SECOND-PREMIATED DESIGN.
TENNANT AND COLLINS, ARCHITECTS.

Other Designs.

The assessor highly commended the scheme submitted by Mr. Theodore Sington, although the plan looks broken up with detached wings at all angles, while the school classrooms mostly face north. A very fine set of drawings, with a strongly-defined and compact plan on good lines, was submitted by Mr. Arthur T. Greenwood, and two clever schemes were also noticeable as being the work of Messrs. Woodhouse, Corbett and Deane. One set of plans, remarkably like the second-premiated, and worthy of mention, was submitted by Messrs. Shaw and Vowles, of Manchester.



SECONDARY SCHOOL, GOOLE: BLOCK PLAN OF FIRST-PREMIATED DESIGN.
WILLINK AND THICKNESSE, FF.R.I.B.A., ARCHITECTS.

GOOLE SECONDARY SCHOOL COMPETITION.

About 60 designs were submitted in open competition by architects in response to the invitation of the Goole Joint Body of Governors, who intend to erect a dual secondary school accommodating 300 students, with provision for the conduct of technical and evening classes.

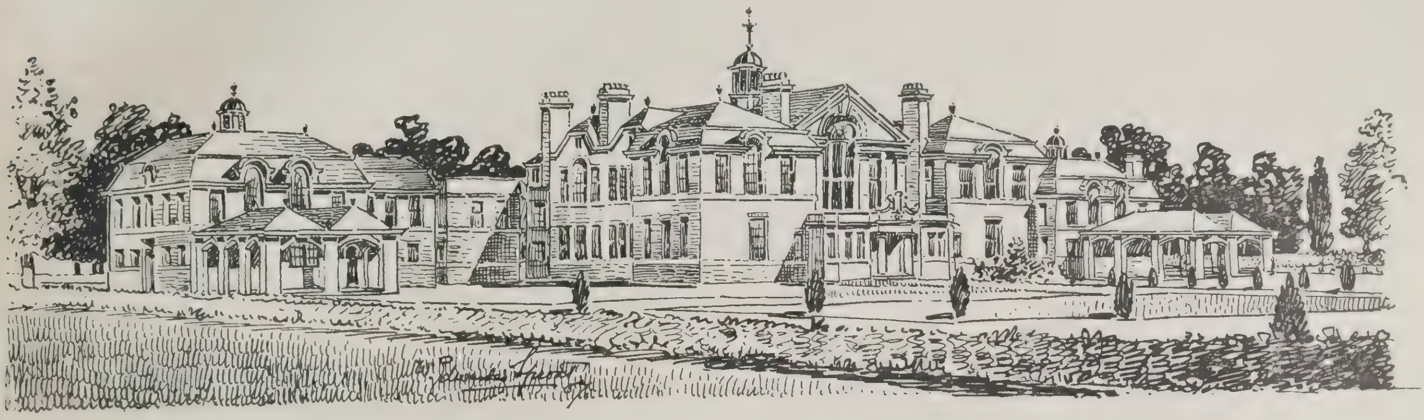
Site and Conditions.

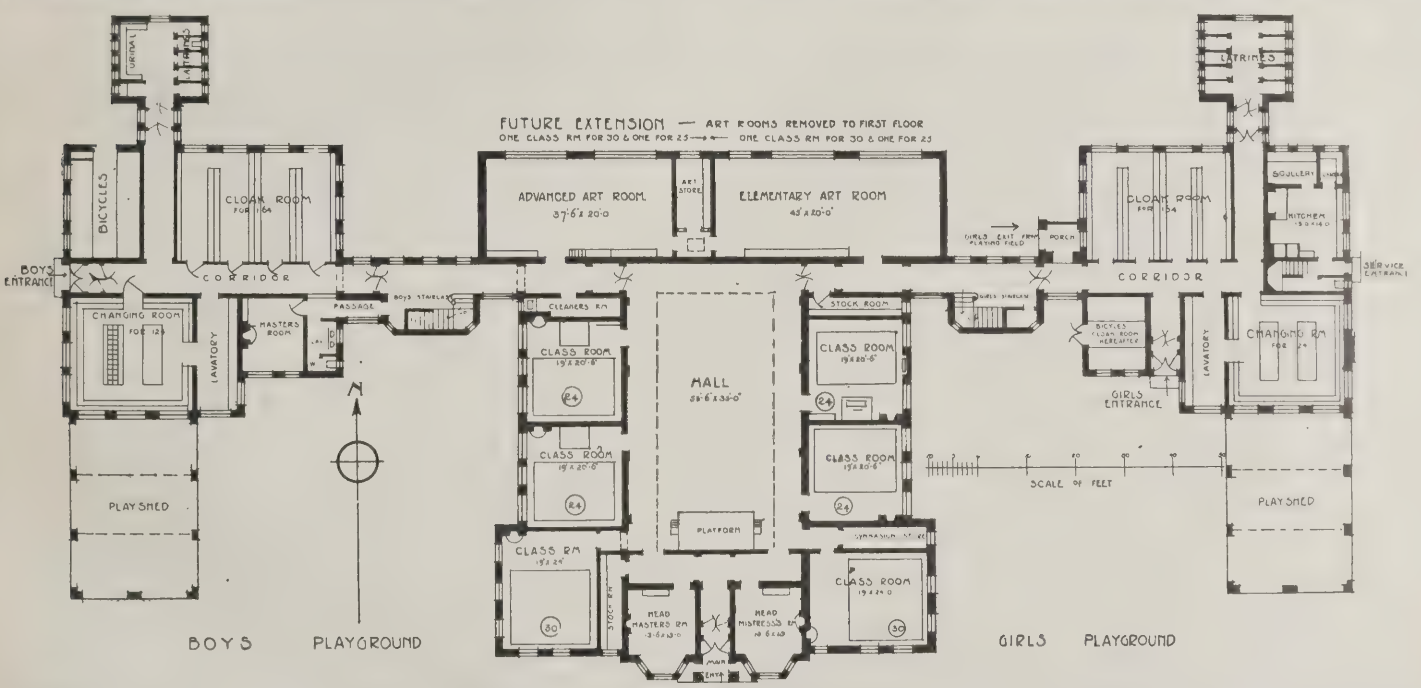
The site of the proposed building has an area of over 7½ acres, with a frontage of 350ft. to the main thoroughfare—Booth Ferry Road. The ground is practically level and faces due south for the principal entrances to the school, with ample playfields and grounds to the north. No restrictions were placed on the competitors regarding the position of the various buildings on the site, but the Board of Education rules and local by-laws had to be complied with in preparing the drawings.

The accommodation required included ten classrooms (one of which had to be suitable for teaching engineering and drawing), commercial room, assembly hall, two lecture rooms, chemical laboratory, mechanical and physical laboratory with science lecture room for experimental demonstrations, a drawing and art room for elementary and advanced scholars, cookery class, manual training workshop, dining hall with kitchen, &c., also rooms for head teachers and assistants, and conveniences; also separate entrances, cloakrooms and changing rooms for the scholars, with the usual sanitary accommodation, and provision made for probable future extensions. A caretaker's house had to be shown on the plans, while land had to be set aside for a headmaster's residence, together with separate playgrounds for boys and girls. The cost of the building was not mentioned in the conditions, though it was clearly stated that an economical scheme would receive favourable consideration.

The problem for the competitors lay between planning the future extensions and arranging the classrooms, entrances, &c., to the best advantage on the south front, facing the main road. Only the premiated designs have been on view in the council chamber of the Municipal Offices, the other schemes having been returned to their authors shortly after the award was made known.

The assessor appointed by the Governors was Mr. J. Wreghitt Connon, F.R.I.B.A., of Leeds. Judging by the premiated designs (which are carefully thought out, and in advance of some recent plans for similar buildings) the result of this competition is satisfactory to all concerned, and creditable to the assessor.





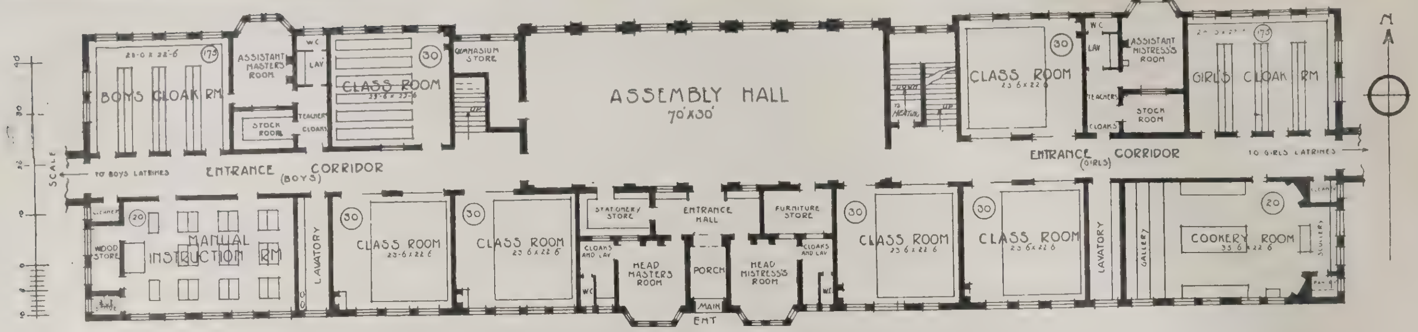
SECONDARY SCHOOL, GOOLE: GROUND-FLOOR PLAN OF FIRST-PREMIATED DESIGN. WILLINK AND THICKNESSE, FF.R.I.B.A., ARCHITECTS.

Design placed First.

This position, with the premium of £50, has been awarded to Messrs. Willink and Thicknesse, FF.R.I.B.A., of Liverpool. The accompanying block plan shows the general arrangement. Full advantage has been taken of the spacious site to set back the building a fair distance from the main road, which enables the asphalt playgrounds for boys and girls to be situated in the forecourt, midway between the gardens and the school. It is presumed that the master's house and caretaker's lodge, with gardens and approach, would partly screen the playgrounds from the public street, though playgrounds for advanced scholars (particularly those in a secondary school) are best situated in the rear of the main building. In this case the school suffers architecturally from the covered playsheds attached to the principal front. The conveniences of the students have not been so carefully considered. The latrines would be better approached from the playgrounds by a covered way, instead of through an internal corridor and several swing doors. The building and surroundings would also be enhanced by placing the keeper's lodge to the west side of the site and the master's house to the extreme east, so that the grouping of the building could be seen from the main road.

The boys' playing field is at the rear of the girls' and is approached by a side pathway. For supervision, the land might be more advantageously divided out into two equal portions allotted to boys' and girls' playing fields, with entrances at each end nearest the latrines—all placed at the rear or end-wings of the building.

In the planning of the school for future extensions this scheme meets the requirements without any new additions on the ground floor by cleverly utilising the art rooms as future classrooms. At the same time the art rooms are detached from the assembly hall by pass doors, thus allowing them to be used for evening classes without the necessity of the scholars traversing the whole school. The position of the assembly hall, with all the classrooms grouped on the east, south and west sides, and the art rooms on the north, forms an ideal arrangement for this type of school. The centre block is thus self-contained and the main stairs for boys and girls forms part of the main connecting corridor, saving cube space, yet central and convenient for the scholars. All the sanitary conveniences, cloak and changing rooms, which do not require to be carried up the same height as ordinary classrooms, have been placed in two wings at the ends of the main corridor. These rooms in detail might be more compactly planned, and the latrines could be placed nearer the covered playsheds, and if possible made to form part of the main outbuilding. To save cube, the main corridor is cut down to a minimum, being 6ft. wide. This is permissible where the classrooms open into the corridor, but the cloak and changing rooms should be recessed or have a corridor at least 8ft. wide where the traffic is concentrated when the school opens or closes for the day. Too many swing doors are placed at intervals along the main corridor. Some would no doubt be permanently opened, but the double pair of doors before entering the latrines could be reduced in number and yet prevent any through draughts. The balance, and the main lines of the plan, with good teaching arrangements, also small cube contents, are important factors which have influenced the assessor in making his award in its favour. The conditions of the competition are carefully adhered to in every respect and the plans are good working ones, excepting a few details



SECONDARY SCHOOL, GOOLE: SECOND-PREMIATED DESIGN: GROUND-FLOOR PLAN. TENNANT AND COLLINS, ARCHITECTS.

which require revising. The upper floor shows accommodation for four classrooms and two lecture rooms, all entered off the gallery of the assembly hall. Over the boys' sanitary wings, at a lower level and entered from staircase corridor, are the laboratories, with balance and preparation rooms, &c., also a lecture room conveniently placed for the use of both laboratories. On the girls' side, equally well arranged, are the cookery classroom, scullery, pantry, &c., with dining hall, service rooms and stairs, and mistresses' room. The elevations are quietly treated in a scholastic manner, but could be improved by omitting the ornamental terminals on the roof ridges.

Messrs. Willink and Thicknesse submitted a second scheme, which was also in the final selection, but the plan covered more ground and the question of cost was against this set. A cleverly drawn and well-set-up perspective accompanied the scheme and the elevations showed more architectural character than the selected design.

Design placed Second.

The premium of £25 is awarded to Messrs. Tennant and Collins, of Pontefract. Compared with the openness and detached appearance of the design placed first this scheme is more compact and well-balanced, while covering about the same area in cubical contents. This may be partly accounted for by the head-teachers' rooms, with conveniences and stores, having to be carried up to the same height as the classrooms. It will be noted that the hall has only one classroom entered from it, and is practically a large self-contained room. The playgrounds are well supervised from the teachers' rooms and the lay-out of the ground is preferable to the first-premiated scheme, particularly the position of the latrines, which are admirable for sanitary reasons and for convenience to the scholars. Objection may be taken to the lighting of the ground-floor corridor, but the main stairs and end doorways would materially assist this drawback which many compact plans have. This corridor is reduced to a minimum in length and is 8ft. wide—points in its favour when cost and efficient service have to be considered. An endeavour has been successfully made to secure as much direct south light as possible into the majority of the class-rooms. On the upper floor this scheme undoubtedly looks best, so far as lighting is concerned, having the major portion of the teaching rooms due south. The art rooms, laboratories and lecture rooms, preparation, balance rooms, &c., complete the first-floor plan, with ordinary classrooms in the centre of the south front: all the foregoing rooms being well arranged and adapted to their different purposes, and exhibiting a thorough knowledge of the requirements of such a school. The design was well drawn, though the elevations did not display the same ability as the planning.

A second set was also submitted by Messrs. Tennant and Collins and in many respects was superior to their premiated design. It was on the lines of the accepted scheme, with the hall to the back, and with east and west lighting principally for the classrooms. The detachment of the sanitary wings and special rooms was remarkably good, especially the ventilation, lighting, and compactness of the plan. No perspectives were submitted by this firm, though they would have assisted the elevations and would have showed the grouping of the buildings.

Notes on Competitions

Children's Hospital, Sunderland Infirmary

At the meeting of the General Committee of the Sunderland Infirmary held on February 14th it was reported that 59 architects had submitted competitive designs for the new Hospital, and that the assessor had awarded the premiums as follows:—1st (£100), Messrs. Armstrong & Wright, Newcastle; 2nd (£50), Messrs. Houston and Houston, London; 3rd (£25), Messrs. Henman and Cooper, Birmingham.

High School for Girls, Wallasey.

The award of the assessor, Mr. J. Wreghitt Connon, F.R.I.B.A., of Leeds, who was appointed by the Education Committee in the above competition (limited to twenty architects practising in Lancashire and Cheshire), is as follows:—1st, Messrs. Appleyard and Quiggin, AA.R.I.B.A., 67 Lord Street, Liverpool; 2nd, Messrs. T. Mellard Reade and Son, Liverpool; 3rd, Mr. Joseph Holt, A.R.I.B.A., Manchester; 4th, Messrs. Deacon and Horsburgh, Liverpool; 5th, Mr. L. J. Hughes, Liverpool. In view of the plans now in preparation for the competition for new boys' grammar school, the Committee resolved that it was undesirable at present to exhibit the above five sets of designs. They will, however, be exhibited after the designs have been received for the Wallesey Boys' Grammar School.

Dundee Technical Institute.

It will be recollected that the Dundee Institute of Architects made a protest against the conditions of this competition, and memorialised the Technical Institute Committee on the matter. The Committee have now replied to the memorial. They state that they "cannot consider" the delegation of their powers to any assessor, though they graciously agree to increase the commission from 4 to 5 per cent. inclusive of measuring fee; which, so far as architects are concerned, may be reckoned as amounting to "Thank you for nothing."

Public Baths, Ashton-in-Makerfield.

Out of eight submitted, the design of Messrs. Prestwich and Son, architects, of Leigh, has been placed first in this competition, which was limited to architects practising in the Wigan and Leigh districts. The building is estimated to cost £6,000. Mr. William Owen, F.R.I.B.A., was the assessor.

New School, Hendon.

A school to accommodate about 1,000 children is to be built at West Hendon, on land purchased from the Ecclesiastical Commissioners, and the Education Committee have decided to invite five architects to submit designs.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
March 9	ELEMENTARY SCHOOL AT WIMBLEDON — for 1,000 children. Names and qualification by this date to A. Steele Sheldon, clerk to Education Committee, 12, Queen's Road. Wimbledon. Premiums of £150, £100 and £50. Mr. John W. Simpson, F.R.I.B.A., assessor. Fifteen architects to be selected to compete.
March 15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham. Summary in "Builders' Journal," January 16th.
March 28	LIBRARY AT FAILSWORTH (to cost £3,000). Premiums of £20 and £10. Conditions from H. C. Broome, clerk, Council Offices, Failsworth. Deposit, One guinea.
March 30	LIBRARY AT DUDLEY.—Limited to architects practising within 50 miles. Conditions from H. C. Brettell, town clerk, Dudley.
March 30	PRESBYTERIAN CHURCH AT ROKER, SUNDERLAND.—Premiums of £25 and £15. Particulars from George W. Bain, 46, John Street, Sunderland. Summary in "Builders' Journal," Feb. 20
April 2	EXHIBITION COTTAGES AT SHEFFIELD & NEWCASTLE. Particulars from Henry R. Aldridge, 45, Bank Street, Sheffield.
April 30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May 17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.

THE ARCHITECTURAL ASSOCIATION.

Mr. Horsley on Architectural Training.

At the last meeting of the Architectural Association Mr. Gerald C. Horsley, F.R.I.B.A., read a paper on "Some aspects of Training and Design." Owing to the pressure on our space we were obliged to hold over the report of the paper last week, but we now give it.

"Some time ago," said Mr. Horsley, "a well-known writer stated at a conference of teachers that his contempt for modern education was only exceeded by his contempt for men who gave up their lives to teaching, and for those—a feebler sort in his opinion—who talked about education. His sympathies were wholly with men who went forth and did things."

"The speaker, perhaps, reserved his admiration for what we call the 'self-made man,' and we may guess that had he been addressing architects on the subject of their education, he would have advised them to go forth and learn their work by building. The advice, if profound, is primitive; it accords better with the events of an earlier day, when architecture was in a more experimental state than our knowledge allows at the present time. It is perfectly good advice for experts, but hardly for men whose feet are crossing the threshold of the workshop of Art. These men know that they must learn their work in other ways as well as by the experience gained in actual practice: and it is because I believe there is both room and need for a larger measure of preliminary training before building is undertaken than the student of architecture generally allows himself that I venture to set down the present remarks."

GARE DU NORD, PARIS. HITTORFF, ARCHITECT.

Before making any suggestion as to what might be the weak spots in our training, Mr. Horsley referred briefly to a few of its advantages and opportunities, particularly as the student of to-day could hardly realise the value of his inheritance in means of study compared with the opportunities which would have been open to him fifteen or twenty years ago.

"First to be noticed was the valuable scheme of co-ordination of the principal architectural schools in the country—the Architectural Association schools, the schools of University College, King's College and Liverpool University—drawn up by the Board of Architectural Education; a scheme which had been cordially accepted by the profession, and was working well. It was, however, too recent for us to have a clear-cut idea of its ultimate effect upon English architecture, though it was believed to be founded upon right lines.

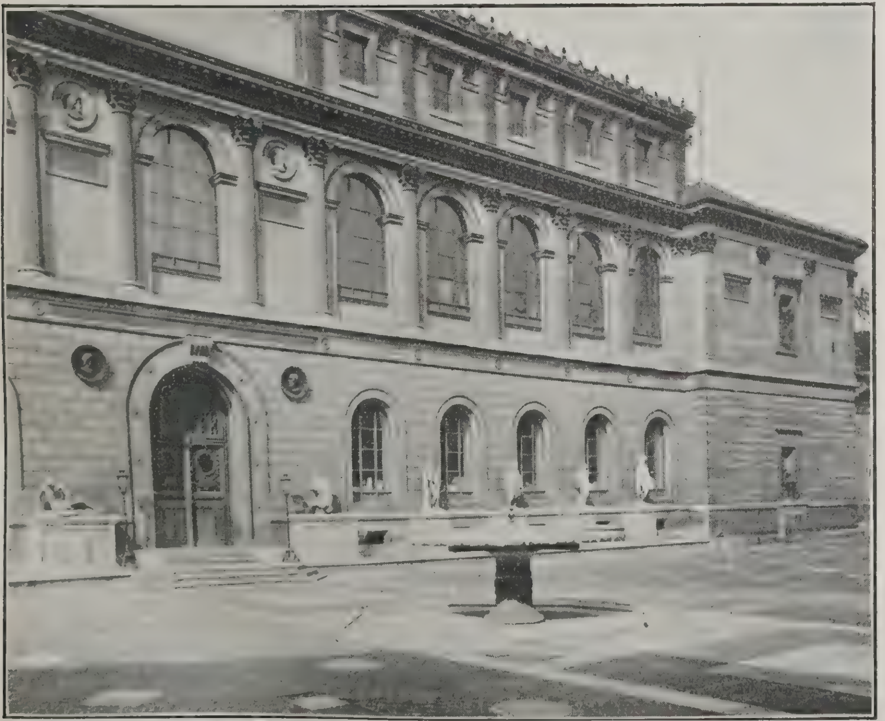
In addition to the schools under the scheme were those at South Kensington, Manchester, Birmingham, &c., where the work done was very similar, and there were many technical and county council schools which nearly all had architectural and building trade classes. The craft classes were not utilised to any extent by architectural students, owing chiefly to the fact that the influence of the trades-unions was at present unfortunately against the admission of anybody but members of the unions into the classes for the study of the building crafts. But it had long been recognised that it would be an advantage to young architects to join these trade classes in order to obtain practical knowledge."

Returning to the scheme of the Board of Architectural Education, Mr. Horsley said the principal departure from the procedure of the past was the establishment of the two years' preparatory course before the student was articled to an architect. In the past the student was articled without any preliminary training, and his early architectural education depended upon the office in which he was placed; in a good office he would get varied experience, both artistic and practical; in a bad office he might have nothing to do but some indifferent tracings.

In spite of drawbacks of this kind, however, apprenticeship was universally believed to be the bedrock of any good system of architectural training, and the Board of Architectural Education had very wisely retained this system, with the addition of the preliminary two years' course.

During the term of apprenticeship the Board advised a continuance of the school course, and the theoretical knowledge acquired in the school, combined with the practical knowledge acquired in the office, ought to build firmly the foundations of power to design.

Further, the syllabus of the Board advocated the study of ancient buildings, which was so great and so essential a feature in the training of enthusiastic students five and twenty and more years ago; and which, it was to be hoped, no newer teaching organisation in the future would ever attempt to discourage. Unfortunately, with the growth of easy photography some modern students


ECOLE DES BEAUX-ARTS, PARIS: LIBRARY FACADE. F. DUBAN, ARCHITECT.

appeared to think that to take photographs of a building was as good as sketching and measuring it. Never was a greater mistake made; it was impossible to find out the secret of the beauty of an old building without measuring and drawing it, and the sooner the 2ft. rule and drawing-block took the place of the camera on these occasions, the better would be the study of architecture.

As matters stood the formulated course of the Board was a thorough school course, and it was a question whether the subsequent freedom of action was not the chief fault in our training, and whether it was not responsible for some of those weaknesses in design which we would prefer not to see in any of our students' advanced competitions.

If we believed a further course was necessary, it would have to be of a distinctly advanced character; the influences in it would have to be, above all, artistic, and constant association with students of other arts, such as painting, sculpture, &c., would be required.

BIBLIOTHÉQUE STE. GENEVIÈVE, PARIS. LABROUSTE, ARCHITECT.

Such a scheme presupposed the existence of a great college of art—a University of the Fine Arts—and it was significant that the nearest approach to such a university that we had in England was contained in the schools of the Royal Academy. This was because the architectural school there (as in the better-attended schools of painting and of sculpture) was adapted for the advanced student and not for the beginner. We could conceive that if the admirable system of instruction for architects there given were widened and extended, and connection established with the schools of other bodies, we should have a University of the Fine Arts.

If we looked abroad we saw in Paris, in the senior classes of the École des Beaux-Arts, an institution of this kind. It was the ambition of young architects in Paris who had passed through some years of preliminary training to enter these classes. (Mr. Horsley gave a brief description of the work done there, his remarks being illustrated by some drawings lent by Mr. Phené Spiers. Mr. Horsley also showed some views of nineteenth-century buildings by French architects—of which the three here given are representative—and expressed the opinion that they could not have been executed without the fine training given at the Beaux-Arts. Slides were also shown of some of the work done by French students in competition for the Grand Prix de Rome, after they had finished their course at the École des Beaux-Arts. Mr. Horsley gave a short account of the inception and scope of the school, referring his hearers for further particulars to the article by M. Gaudet in "The Architectural Review" of October, 1903, and a paper by the late Mr. W. H. White, published in 1883, in the "Transactions" of the Royal Institute of British Architects.)

Architectural education in France was above all things artistic, while not neglecting scientific and purely technical processes. The object of the French training was to render the student receptive, to make him fruitful in design, and imaginative: and by making the training very general in character it hoped to foster that gift with which all artists should be born—namely, the gift of having ideas.

With these ends in view an important position was occupied, in his relations to his pupil, by the master of the atelier or studio. In France, a young man who desired to become an architect acquired, first of all, some knowledge of drawing and modelling, &c., in one of the smaller art schools. He then joined an atelier, much as he would an office in England; yet the difference was great, as the atelier was a studio for the study of architecture only, presided over by the master or patron, who was an architect in practice. It was not an office in which the master's work was done, as in England.

The system which encouraged a devoted attachment of the pupil to the master, and the whole atelier to the master, created an *esprit de corps* which was a great factor in the formation of a French artist.

After having joined his atelier it was the custom for the pupil to prepare himself for the entrance examination of the École des Beaux-Arts; and as this school included painting and sculpture as well as architecture, the students were always associated with other artists of the future, and formed a community which, even when their studies might be for a time purely scientific and technical, never allowed them to forget their vocation.

The classes in the École embraced such sciences as geometry and physics, stereotomy (or section work), strength of materials, construction, history, drawing, and modelling, but the adaptation by the pupil of this knowledge artistically was influenced by the master of the pupils' atelier.

The pupil having passed the entrance examination of the École, joined the second or junior of the two classes into which the school was divided.

From start to finish he was taking part in competitions in design, these competitions being judged not solely by the masters or professors of the school but by a jury of 30 architects, whose services were given gratuitously.

Students were not restricted as to time, but their progress through the school entirely depended on the number of prizes or marks obtained in the competitions; if enough marks were not obtained, they ceased to be members of the school. For instance, a student on entering was at once in the second class. Here he remained until he won a medal or sufficient marks to promote him into the first class, with the right to participate in the senior competitions. It was this emulation which inspired the school. But practical knowledge was not overlooked, and the courses in materials and construction were very thorough.

In the first class the studies of the students were essentially artistic, competitions being held at regular intervals, and courses given in the theory and history of architecture, but here also there were courses in heating, ventilation, building by-laws, contracts, &c.

Students in the second class aimed at becoming members of the first class, while for the latter there was the Diploma—a high distinction. In essaying for the Diploma the student selected his own subject, which was submitted to a special committee. If approved, he proceeded to work out his design, which was submitted to the members of the jury, while he himself underwent a *viva vôce* examination at their hands to test his fitness as a practical architect: he had also to give evidence that he had been engaged in some practical architectural work.

This, then, was the culminating point of the French student's career, and to make clear what an arduous course had to be gone through it was enough to say that there were only seven or eight hundred architects in France who possessed the Diploma.

Yet another prize was the Grand Prix de Rome, open only to Frenchmen, who must be unmarried and between the ages of 16 and 30. This prize was not part of the École des Beaux-Arts, but was given by the "Institut de France." As a matter of fact it could only be a competition between the best pupils of the Ecole des Beaux-Arts, as none other would have a chance. There was first of all a process of preliminary competitions and eliminations, until finally ten only were chosen by a jury of architects to compete in the final competition. The successful competitor spent four years at Rome at the Villa Medici, and was obliged to carry out some definite work in the study of architecture in Italy, Greece, or the East. The student during this time was the guest of his country, and was free to promote his studies in comfort and dignity, amidst the companionship of the most gifted men of his time in the Arts, and he was certain of employment by the State on his return to France.

"Such, then," said Mr. Horsley, "is a brief sketch of the system of architectural training which obtains in France. For thoroughness and for masterly qualities it has long been pre-eminent in Europe. But all architects in France do not go through the whole of this training. Many, if they get into the second class, may not pass into the first. Our concern, however, is not so much with the student as with the system of training which makes it possible for those who have time and talent to attain a high standard of excellence."

In conclusion, Mr. Horsley pointed out that although tradition should not be so blindly followed as to stultify individual talent and invention, we surely see, in studying the French methods of architectural training, the benefit of a carefully planned scheme of advanced study among artists. To promote this there would be no need to give up our cherished institutions. "I would not willingly change anything in the syllabus. We need not have ateliers exactly like the French. Our offices can be very good studios, and our best schools are already studios of a high order. But what we have not got, and what I think we need, is a great central comprehensive school of art, preferably as in Paris, of a great national character—that is to say, supported by the funds and encouraged by approbation of the nation—and some system of studentships, or other inducement, which would make it easy for our best students to prolong their studies in art, in conjunction with their studies in practical building work."

New Humber Motor Works, Coventry.—All the sanitary fittings required in these works are being supplied by Mr. William E. Farrer, of Birmingham, London, etc.

R.I.B.A.

A business meeting of the Royal Institute of British Architects was held on Monday evening, at 9, Conduit Street, W., the chair being occupied by Mr. E. T. Hall, vice-president.

Council's Report on Registration.

The Chairman presented the report of the Council on the resolutions with regard to the question of registration passed at the general meeting held on April 3rd, 1906.

The main principles embodied in these resolutions were as follows:—(1) That the Institute should endeavour to obtain Parliamentary recognition of its membership, declaring it to be in the public interest that architects recognised as qualified by a competent authority should be distinguishable from those not so recognised; (2) That after 1912 it should be made compulsory that architects, before receiving the diploma of membership of the Institute, must have passed through a definite course of architectural education, and that the Institute should be made the statutory authority for such education and examination; (3) That a temporary class of Licentiates of the Institute should be established; (4) That Fellows should be elected from the Associates, and by the Council in special cases; and (5) That a scale of charges should be legalised.

As a first step, the Council recommended that a revised or supplemental charter should be applied for embodying as many of the above principles as possible, and that afterwards an Act of Parliament should be applied for.

With regard to compulsory architectural training, the Council recommended that the charter and by-laws should be altered to make this training a condition precedent to entering for the Final Examination.

With regard to Licentiates, it was intended that the period of entry into this new temporary class should close twelve months after the date of the revised or supplemental charter. Licentiates (L.R.I.B.A.) are to be not under thirty years of age, having been engaged for at least five successive years as principals in architectural practice, or engaged in the study or practice of architecture for not less than ten years.

With regard to the election of Fellows, this is governed by a former resolution of the Institute to the effect that after December 31st, 1907, Fellows shall be required to have passed the examinations qualifying for Associateship, or shall be elected from the Associates; but in special cases the Council may grant election to Fellowship without examination by a vote of three-fourths of the members (the Council recommended that at least sixteen members should be present); in addition, the Council recommended that Licentiates might also be eligible for election to Fellowship under certain conditions.

The Council also proposed to increase the disciplinary powers of the Institute by obtaining authority to publish in the public Press the expulsion of any member.

They did not approve the suggestion that the present title of the Institute should be altered to "The Royal College of Architects."

They recommended (*a*) the modification of the by-law requiring the formal presentation of members at a general meeting; (*b*) the abolition of the Council's power to elect the president or president-elect of an Allied Society direct to the Fellowship; (*c*) the consideration of the representation of the Allied Societies on the Council.

The Council's report was adopted by the meeting.

New Fellows and Associates.

The following were elected:—

Fellows.

T. Ballantine (London)
W. R. Butler (Melbourne)
A. L. Campbell (Edinburgh)
F. W. Chancellor (London)
F. W. Deas (Edinburgh)
W. E. Hazell (London)
J. R. McMillan (Aberdeen)
P. W. Meredith (London)
S. V. North (London)
H. Dighton Pearson (London)
J. Sansom (Liskeard)
J. N. Scott (Edinburgh)
E. Summerhayes (Perth, W. A.)
J. Sutton (Buenos Aires)
Arnold Thornely (Liverpool)
T. Francis Tickner (Coventry)
George Watt (Aberdeen)

Associates.

A. J. T. Abel (London)
W. T. Armstrong (Lancaster)
T. S. Attlee (London)
G. S. H. Bradford (Cape Town)
E. B. Crossley (Nottingham)
T. L. Dale (London)
H. A. Dalrymple (Grays)
N. J. Dawson (Chelmsford)
A. C. Denny (Dumbarton)
C. M. Drewitt (Bolton)
P. M. Fraser (London)
J. T. Halliday (Stockport)
J. H. Hargreaves (Manchester)
D. P. Hayworth (London)
J. R. Hobson (New Eltham)
W. A. Hodges (London)
J. N. Horsfield, jnr. (London)
C. E. Howitt (Nottingham)
S. Jacques (Forest Gate)
G. T. Jell (London)
N. Jones (Southport)
P. H. Keys (London)
H. Langman (Liverpool)
L. A. Loades (Morpeth)
R. A. Loveitt (Coventry)
C. E. Lovell (Gravesend)
W. G. Milburn (London)
P. Minor (Manchester)
C. L. T. Morgan (London)
A. E. Munby (London)
N. T. Myers (London)
G. Nott (Leicester)
C. H. Perkins (Carlisle)
A. P. H. Pierce (London)
J. C. Reid (Glasgow)
H. P. Roberts (Horsham)
P. T. Runton (Hull)
W. T. Sadler (London)
I. T. Sifton (London)
J. Myrtle Smith (London)
D. L. Solomon (London)
A. K. Tasker (Nth. Shields)
R. W. Thorp (Leeds)
F. J. Toop (London)
J. I. Tweedie (Ecclefechan, N.B.)
C. P. Wade (Yoxford)
F. Wade (Bradford)
A. F. Wickenden (Maidstone)
W. B. Wyllie (London)

THE A. A. PLAY.

If one had any doubt about the "Purple Patch" making things lively at the Architectural Association, it was only necessary to be at the Gaiety Restaurant last Wednesday or Thursday, when the A.A. play was revived under the title of an extravaganza. Certainly there were some queer fancies, and we were all vastly amused by the chorus of Roman working men with an infinite capacity for rich Falernian wine; with the æsthetic architect; with the builder, strange and wonderful, possessed of a Panhard and engulfed in fur and goggles; with the clerk of works and the foreman, and all the rest of this merry crew. We will not attempt any outline of the plot (for want of space), but we must not pass the play unnoticed, as it was a very creditable effort, and the A.A. orchestra especially are to be congratulated on their part of the performance.

Galway Fever Hospital.

This competition has been decided as follows:—1st, Mr. A. Cowlishaw, Galway; 2nd, Mr. Lionel U. Grace, London; 3rd, Mr. D. J. Barry, Reigate; 4th, Mr. T. O'Connell, Cork. The Assessor was Mr. G. C. Ashlin, of Dublin.

Welholme Church, Grimsby.

Sir W. Alfred Gelder, F.R.I.B.A., of Hull, the Assessor in this competition, has made the following award on the sixty-three designs submitted:—1st, Messrs. C. Bell, Withers and Meredith, London; 2nd, Messrs. Clark and Moscrop, Darlington; 3rd, Messrs. Marshall and Tweedy, Newcastle-on-Tyne. Designs by the following are very highly commended:—Messrs. George Baines and Son, London; Messrs. F. Boreham and Son, London; Messrs. Nicholls and Stockwell, Swindon.

VENTILATION OF THE HOUSE OF COMMONS.

The ventilation of the House of Commons is always a matter of interest to architects, builders, and others. Taking advantage of this, Mr. Walter Yates, M.I.M.E., &c., of the well-known firm of Messrs. Matthews and Yates, Ltd., Cyclone Works, Swinton, near Manchester, read a paper on the subject recently before the Institution of Heating and Ventilating Engineers. In his introductory remarks he described the old arrangements, which have given rise to so much adverse comment, and then proceeded to give particulars of the scheme as now installed, and in which work Messrs. Matthews & Yates, Ltd., have been largely interested.

Fresh air is admitted at the terrace or river front, and, after going through tempering coils situated close to the inlet, passes through a specially-constructed copper gauze screen upon which water jets are continually playing whenever the fan is at work. This screen abstracts all the dust and a large amount of bacteria from the air, which then passes through a glazed tiled subway to a large "Cyclone" input fan, capable of delivering 70,000 or 80,000 cub. ft. of air per minute if required, but normally delivering about 60,000 cub. ft. per minute.

On leaving the fan the air passes (if the weather is foggy) through a cotton-wool filter, which is remarkably effective in taking all fog out of it. If the outside atmosphere is fairly clear, the air passes at once into the heater chamber, which is a room practically the size of the debating chamber, and in which are situated the heating batteries. Above the heater chamber is the mixing or equalising chamber, where, as the name indicates, the air is brought to an even temperature and velocity, after which it passes through the floor of the debating chamber into the House itself.

The air enters the House through the floor by perforations, which are located not only in the centre and cross gangways, but also communicate with slots both in front and behind the seats, so that practically the whole floor is an inlet for the fresh warm air.

The air continues to rise to the ceiling of the House, and passing through the panelled ceiling is then extracted by means of another fan similar to the input fan, which carries away all the vitiated air, and delivers it into a vertical upcast into the atmosphere. Both fans can be regulated by one revolution at a time from minimum to maximum, and this gives enormous control of the ventilating arrangements. This control (as also of the heaters, which are capable of giving more than is ever required) is from the equalising chamber.

The system is capable of giving 60 cub. ft. per minute to every member and every occupant of the galleries when the whole House is crowded, and under normal conditions will give 130 cub. ft. per minute to the occupants.

Mr. Yates described the various tests which have been made, showing not only how the air is now free from bacteria, $C.O._2$ and dust particles, but is delivered into the House in a perfectly fresh and tempered state.

It is true we hear from time to time complaints from individual members, but invariably these complaints can be traced to other causes than the ventilating arrangements, and all the authorities are fully satisfied that there is not a more perfectly ventilated building in the country than the debating chamber of the House of Commons under the present arrangements.

Our Plates

Cottages at South Mimms, Herts.

This row of cottages has recently been built for V. B. Tritton, Esq., in place of a group of four considerably smaller ones, which were very defective in sanitary accommodation, and in a dilapidated condition, with only one bedroom apiece. The materials for the new ones are red bricks and lias lime rough-cast for walling, red tiled roof, and white painted window frames; the doors and fencing are painted green. The architect was Mr. Geoffry Lucas, of 16, Hart Street, W.C., and Hitchin, Herts, and the contractors were Messrs. J. Raban and Sons, of Baldock, Herts.

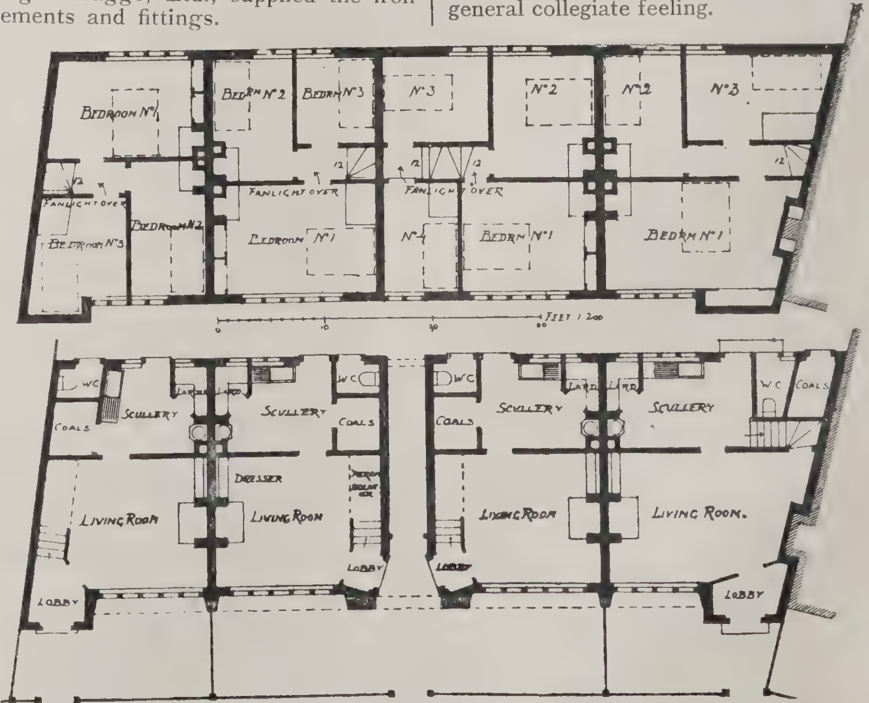
House at Surbiton.

This house, which has lately been completed, occupies a corner site at the junction of four roads. The external wall of the servants' portion is brought out to the boundary, securing extra garden space, and at the same time obtaining a somewhat novel effect. The walls are of Crowborough bricks relieved by red brick and tile dressings to the window heads and sills. The window frames have wooden projecting pins, and are painted white; iron casements are used throughout where lights are made to open. The glass is divided up with broad leads in large divisions. The eaves brackets and iron casements are painted a dull black, and the down-pipes green. Special-designed mantels are used to all the best rooms, and the hall is panelled to detail. The house is planned with a view to simplicity of arrangement, and the exteriors are treated as quietly and simply as possible. Mr. A. Jessop Hardwick, F.R.I.B.A., was the architect for this and several other houses on the estate. The contractors were Messrs. Limpus and Son, of Surbiton. Messrs. George Wragge, Ltd., supplied the iron casements and fittings.

SCHOOL PLANNING.

Mr. Philip A. Robson, A.R.I.B.A., read a paper on "School and College Building" before the last meeting of the Leeds and Yorkshire Architectural Society.

Mr. Robson disposed of elementary schools with a few remarks, and spoke mainly of secondary schools and training colleges, first because elementary schools were now on a scientific and economic basis which was well known, and secondly because the rules for planning secondary schools had been twice issued in a nebulous manner which seemed to imply that the subject had to find itself by gradual evolution rather than by clear directions to the promoters of secondary school buildings from headquarters. With regard to classrooms, Mr. Robson said left-hand light was a fetish which had been unduly glorified; in some cases it was positively bad, and in a babies' room right-handed light was preferable. He was inclined to think that the Cowper Street School in Leeds was the last very large school to be built (although in London a school for 3,000 children had just been erected under exceptional circumstances), and he was sure that better educational results would emerge from smaller schools better distributed. Economy should be effected by cube rather than by area. The only gain in making classrooms 16ft. from floor to floor was that it was possible to get mezzanine floors off the staircases. Secondary schools would be built in increasing numbers during the next few years because we were behind other countries in this class of building. Mr. Robson said he was inclined to think that we over-windowed our schools, especially in country districts, while, as to ventilation, distinction should be drawn between schools in towns and those in the country, and again between those in or near manufacturing centres and those in better positions in the same district. Among large public schools it would be well to study Christ's College, Horsham, for boys, and the Roedean school at Brighton for girls. The plans for the Welsh universities had been worthy of study, but the designs seemed to miss the general collegiate feeling.



COTTAGES AT SOUTH MIMMS, HERTS: GROUND AND FIRST-FLOOR PLANS.
GEOFFRY LUCAS, A.R.I.B.A., ARCHITECT.

MR. BLOMFIELD'S ACADEMY LECTURES.

On February 21st Mr. Reginald Blomfield, A.R.A., the new Professor of Architecture at the Royal Academy, delivered the first of his four lectures — "The Study of Architecture." He advised the study of architecture to be approached in two ways, both of which were important. The first was the study of buildings, with a due appreciation of the practical conditions which led to their erection. It was necessary to thoroughly analyse a building in order to appreciate the architect's work. They must approach it from the standpoint of practical conditions, bearing in mind what the architect set out to do, what were the limitations of the problem in hand, and taking account of any extraneous matters which had a bearing upon the design. It was to be remembered that an architect's work called for qualities and practical considerations which were absent in other arts.

In studying a building it was necessary to analyse the development arising out of constructional and other needs. If they failed to acquire this habit they would be driven back on an architecture which was merely the exploitation of fashionable expression. They must approach their work as artists, but with the proviso that the manner of their approach must be practical; they must be on their guard against sentimental considerations. Historical and sentimental associations with regard to buildings should be disregarded, for, though these were interesting to the historian and the archæologist, they had no bearing on their work as architects. They must guard against a waste of time on unessentials, and study wholly the means by which beauty was attained.

The relations of art to the morals of the builders, and the age of a building, were not factors in their study. The student should clearly grasp the meaning of what he saw. He should clear his mind of what was irrevelant, and analyse a building with sympathy; criticism must be sympathetic, and needed to take into account what the building was for, what the architect set out to do, and how he arrived at his solution.

The keynote of Gothic architecture was its frank expression of construction. Once they had got this into their minds they could understand and appreciate Renaissance architecture, which never accepted this rule and was never to be judged by it. Dogmatism in first principles was a snare. The one first principle an architect disregarded at his peril was that his building should be structurally sound and in conformity with its requirements. They should approach these studies with an open mind and without preconceived ideas, and they must put aside anything which would bias their ideas. He instanced Pugin's advocacy of Gothic as the only true Christian style as an uncandid description, inasmuch as Christianity existed 1,200 years before the style which Pugin advocated came into existence. It was merely an expression of like and dislike. There was good work in all ages, and if the Renaissance architects had accomplished some works of greater magnitude, the Gothic masters had left their record in very beautiful detail. It was essential that the student before attempting to embark on original ideas should have a thorough knowledge of his art.

They saw how in the art of painting the older conventions of colour and drawing had been largely abandoned in an endeavour to secure effects of lighting; and in sculpture, beauty and purity of form had been set aside for effects of symbolism. They must not be too ready to abandon the older conventions until they had thoroughly studied them.

This brought the lecturer to his second point in "The Study of Architecture"—namely, a knowledge of the history of their art. They must trace that history in its developments and see how the architecture of Egypt influenced that of the East, how it proceeded from the East through Greece to Rome, and how, on the decline of Rome, architecture developed into the Byzantine and Lombardic styles; how the Byzantine died and its influence passed on to medieval work; then through the phases of medieval work to the classic revival, later the Gothic revival, and lastly, to the present classic revival again.

Reading, however, would not make an artist; they must study buildings, using their brains and avoiding too much use of the sketch-book. Sketch-book architecture was one of the disastrous results of the Gothic revival. It was a notable trait of the Renaissance architects that they studied and analysed the buildings of ancient Rome. The lecturer instanced the manuscript notes of Inigo Jones in Worcester College Library, Oxford, where an account of his travels in Italy was almost entirely in the shape of studies and analyses of the buildings he had visited. Sketching should be regarded only as the handmaid of their art.

For study Mr. Blomfield recommended the City churches of Wren, not only because they were close at hand, but because they showed what good effects could be obtained by simple means. St. Paul's Cathedral was a worthy object for study. Here was a great church covering an area about 500ft. in length and 245ft. in width. The architect's problem was to build a great edifice that would hold about 10,000 people, with liturgical arrangements in conformity with the rules of the Church of England. They should study Wren's method of covering an immense space about 145ft. square, and study the transition from the square to the hexagonal, and from the hexagonal to the round of the dome. They would then proceed to study how the dome was supported, and the manner in which the thrust was taken up. Following this, they could study the area of the dome supports, the proportions of solids to voids, and windows to wall space. They could then proceed to the study of other matters, such as the inner and outer dome, the screen walls of the choir, &c.

Besides this study of buildings, they must also remember the study of historical development, remembering that the resemblance of the modern church to the ancient basilica was merely accidental, and that the entirely different arrangement of the Byzantine church showed that our modern arrangement was not due to any liturgical necessity.

History was also necessary to show them the connection between the dome of St. Paul's, St. Peter's at Rome, and the various other domes of Italian masters of the Renaissance with their original prototype in the Pantheon. They must endeavour to understand the personal temperament of the designer.

With systematic analysis of fine buildings and wider studies they could hope to obtain an accumulation of knowledge on which to base their personal expression.

The lecturer quoted in conclusion a passage from Walter Pater, showing the power of the subconscious self in imitating the little acts of daily life. He pointed out that if this were so in the small matters, how much more likely it would be to operate in the practice of their life's work. The accumulation of great knowledge on which that subconsciousness could draw would brings its reward in later years.

Design and Temperament.

For his second lecture, given on February 25th, Mr. Blomfield took as his subject "Design and Temperament." He recapitulated the points of his first address on approaching the theory of architecture free of preconceptions, and the necessity of habitual and systematic analysis of buildings. There was another side to the story, however, and that was the analysis of the buildings studied with an appreciation of the temperament of the artists who had created them. The technical side should not alone possess them. Though it had to be mastered, the Art of Architecture was something more than technical proficiency. Temperament and imagination were essential elements, and temperament he defined as a force or passion within a man which impelled him to do things differently to other men. Architecture, as the greatest of the arts, must mean translating human wants into visible forms of beauty. A study of the lives and works of representative architects would show the intimate connection between their designers and their temperaments. This was not always possible, owing to the lack of knowlege of the personality of the architect. In such a case one could but interpret the temperament from the work, though this was only feasible when there existed sympathetic contemporary criticism, and thus a sympathetic study was practically impossible prior to the Renaissance. The monuments of Egypt were full of character, though not of individual character. They expressed an unswerving tyranny over millions of slaves. Much might be learnt from such buildings, but not the individual expression that differentiated modern from ancient architecture. The architect, not being a man of leisure, was regarded by the Greeks with contempt. To the Romans this feeling was transmitted, and it required a new vitality from the East to create the individualism that brought about such a tremendous architectural development as was witnessed in Sta. Sophia. Our methods of life were too remote from those of Justinian to understand, from the building, the temperament of the man who designed it. Early mediæval work was a collective effort rather than an individual one, and the history of the men concerned was very obscure. Not until the Renaissance did the physiological study of architecture begin. As an example take Alberti; born of a noble Florentine family, a gentleman and scholar, a man of great accomplishments, both mental and physical, one who found delight in every side of life. This combination of qualities was reflected in his work. He had the austerity and reserve of the scholar and the fastidiousness of the gentleman; but he also possessed the adventurous instincts of the sportsman. The first group of qualities led him to a scholastic view of architecture, and a wrong beginning by working deductively from other scholars, like Vitruvius, instead of inductively from the construction of the buildings themselves. But the adventurer spirit led him to attack the problems of construction, and to find solutions outside the beaten track. His work showed the distinction of his mind. The value of it was more clearly shown by remembering what other men of his time were doing. While they were occupied by detail, Alberti, alone, was thinking in terms of architecture, developing its qualities, and making his appeal by beauty of form, refinement and scale. One other man of the Renaissance was instanced—Peruzzi. From the study of Roman antiquities he drifted into architecture. His antiquarian researches were evidently more thorough than those of his contemporaries; but few things were more surprising than the truthfulness of the Greek spirit he revived, and in which respect he stood alone among the Renaissance architects. He brought the competent freedom of the master to bear on the traditional forms of Classic architecture, not merely in details but in his whole attitude. The lives and work of both these men showed the intimate connection between the artist and his work. Mr. Blomfield referred, in conclusion, to the privilege of being able to study these men, and to the duty of emulating them in steadily considering the finer qualities of life.

Architecture and the Craftsman.

Mr. Blomfield's third lecture was delivered on Thursday, February 28, his subject being "Architecture and the Craftsman." He said the modern theory that in mediæval times the architect was a workman was an engaging one, for it gave rise to the idea of the architect producing his art at the end of his fingers, but it did not necessarily follow that a good craftsman was necessarily a good architect. The actual function of architecture in its relation to the arts must be understood. The early Italian Renaissance was also a period of craftsmen, and it was not until the middle of the sixteenth century that men began to specialise in architecture. It was not until the latter part of the seventeenth century that there was an immense advance in technique.

Towards the end of the eighteenth century there were momentous developments. The neo-Classic tradition breaking down and giving place to the dilettante, architecture became a literary fashion, which is a different thing from scholarship, and one of the leaders of the attack on Classicism was Horace Walpole, whose efforts resulted in Strawberry Hill Gothic, and "Capability Brown," who produced the landscape gardener as a worthy successor of Le Notre.

Kent and Adam both showed a capacity for arranging the old traditions in a new manner, but, in the absence of any vital development, left the way open for the fads and revivalisms of the nineteenth century, though our thanks must be accorded to Chambers and Cockerell, the last of the old guard, for their endeavour to stem the tide which engulfed English architecture.

English architecture had sunk to the lowest depths of degradation by that somewhat remarkable year, 1851, the year of the Great Exhibition. But this year also marked a turning point in the history of the art, for it was about this time that the pre-Raphaelite Brotherhood made its appearance. Its influence on the current ideas of architecture were all for good until the movement, which was not exclusively artistic, came under the sway of the litterateur, and at once lost strength.

Morris, who revolted against an architectural training, first brought forward a new theory of the art, to which he devoted half his life. A building he regarded as a vehicle of decoration, and architecture he defined as the art of ornamenting buildings. These ideas were due to his being both a craftsman and a socialist. As a craftsman the decoration was more important than the building, and as a socialist all craftsmen were equal; no one was above the rest, and there was no architect with supreme control. But this theory entirely overlooked the real art of architecture, the power of thinking in great spaces, and possession of a broad sense of rhythm and completeness. No architect could afford to ignore details, but the primary and fundamental purpose of his work was that a great thought should be expressed. Details should never be studied for their own sake. Modern architecture, however, owed much to Morris, for his advocacy of good work, good material, and good colour, though the relationship between architecture and the crafts had been lost, and was at present lost between the Scylla of mediævalism and the Charybdis of art nouveau. Nature in no case furnished evidence of construction, nor was architecture merely ornamental building. Architecture had been defined as a science and an art, which was a somewhat unhappy definition, because it appeared to divide Architecture into two separate functions, those of a scientist and those of an artist. It was scientific to a certain extent, as it involved the applied sciences and the study of materials. It had to conform to the facts of nature just as a sculptor had to conform to the facts of anatomy. If anything it was a plastic art.

That science alone was not the essential feature in architecture was evidenced by the career of Wren, who left Oxford probably the most finished science scholar of his age, but his early architectural work was far inferior to that he did thirty years later. There was a quality difficult to define possessed by all great buildings, which was not to be compassed merely by attention to details or the strict observation of physical laws. The Pantheon would not be less impressive if stripped of its ornament.

Where architects so frequently failed was in concentrating their attention on details or ornament instead of on the larger question. The great conception of architecture had been lost during the past fifty years; in the Gothic revival it had no part. The revivalist was merely interested in the knick-knacks and gee-gaws of the antiquary. They must dismiss from their minds the craftsman theory.

He could best find a comparison to the architect in the art of music, likening him to the conductor of a great orchestra or to the musician who weaves the music of the instruments into one fine score. It was not necessary that he should be able to play every instrument in the orchestra though he must have a knowledge and appreciation of the capabilities of each. The quality of a great artist was his capability for eliminating the unessential, and for this a certain mental æstheticism was needed.

Correspondence.

Kleine Floors.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—In a paragraph about Messrs. Mappin & Webb's new building in Oxford Street on p. 75 of your issue of February 13th you describe the construction of our patent fire-resisting floors and roofs as "combined reinforced concrete and hollow terra-cotta blocks." We consider this description misleading, and shall feel obliged if you will correct it, to the effect that our construction is not reinforced concrete but purely reinforced brick.

We are most anxious that it should be understood that where we superimpose ballast concrete, which we only do in the case of very large spans, the function of such concrete is only to add strength *in compression*, and that for the strength of our construction *in tension* we are not dependent either upon the quality or the adhesion of the concrete.—Yours truly,

THE "KLEINE" PATENT FIRE-RESISTING FLOORING SYNDICATE, LTD.

ERNEST HIRSCH, *Managing Director.*

LONDON.

[Perhaps the words used did not adequately describe the Kleine system of construction, but we think they are applicable as a general title. In the Kleine floor the hollow or solid terra-cotta or brick blocks are placed close together with flat tension bands of steel on edge low down in the longitudinal joints. This steel is kept in place and protected from corrosion by grout or mortar made of sand and Portland cement. The adhesion necessary to prevent slipping of the reinforcement is given by this cement mortar, and is vitally important to the stability of the floor. With light loads and small spans, sufficient strength in compression is obtained by the blocks or bricks themselves, but for heavy loads or large spans concrete of the usual proportions, made invariably with Thames ballast or hard stone, is added to take the compressive stresses. By reason of the fact that the concrete performs a distinct service, the Kleine system is allied to reinforced concrete construction. Even where concrete is not superimposed the cement mortar is still a concrete and, being essential to the stability of the floor, the Kleine may consequently be held to be a combined reinforced concrete and terra-cotta block system.—ED. B.J.]

Competition for Artizans' Dwellings, Child's Hill.

To the Editor of THE BUILDER'S JOURNAL.

SIR,—In the otherwise accurate description of my design for these buildings in your issue for last week an error of arithmetic has inadvertently crept in. The total number of houses is given as 109, whereas there are 153 in all, namely, 40 of the type with 14 ft. 6 in. frontages and 113 of those with 13 ft. 6 in. frontages. My reason for desiring to point this out is that your note states the total cost of all the houses, and, without this correction, they might appear to be extravagantly costly. Yours truly,

GEORGE HORNBLOWER, F.R.I.B.A.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Claim for Wages against Bankrupt Firm.

X writes: "I am connected with a builder's business that will presently be in the bankruptcy court. From week to week I have left certain arrears of wages that now amount to about £30, the general idea being that such arrears were, some day, to be computed as forming so many shares in the business. I am a partner by general consent, but there has been no document drawn up to that effect. I should be glad if you could advise me as to whether I can claim for the amount of wages due to me."

Your enquiry can hardly be answered in so many words, as its solution entirely depends upon whether you are an employee or a partner. (1) If you are merely an employee and the deferred wages have as yet carried no profits (though there may have been some understanding that in certain circumstances they would be absorbed in the business and that you would then participate in the profits) I am of opinion that a trustee in bankruptcy will pay the outstanding wages in full. (2) If you are a partner participating in the profits, not only will you lose the £30, but you will probably be liable for more than this. I advise you to consult a solicitor at once as to your legal position, giving him full information. F. S. I.

Position of Reading Desk in Church.

T. W. P. writes: "Is it essential that the desk from which the clergyman reads the service in churches having transepts be in the chancel? Could it be in the crossing between chancel and nave?"

The choir stalls, of which the priests' desks form the western portion, are almost universally placed within the chancel and east of the screen. The exception is when the choir projects into the body of the church, as in the West of England plans, but in these instances transepts do not exist, and the choir is surrounded by screens. In collegiate churches the choir is usually placed west of the crossing.

Buildings to Measure near Forest Hill.

FOREST HILL.—T. C. C. writes: "Are there any suitable buildings to measure for the R.I.B.A. intermediate examination near here—within, say, four or five miles?"

The church at Stone, near Dartford (*c.* 1251-74), is available for study and measurement. Many drawings have been made of the wall arcade in the chancel. The Royal Palace at Eltham (fifteenth century) would also be a suitable building. Permission to measure may be obtained from the Office of Works. G.

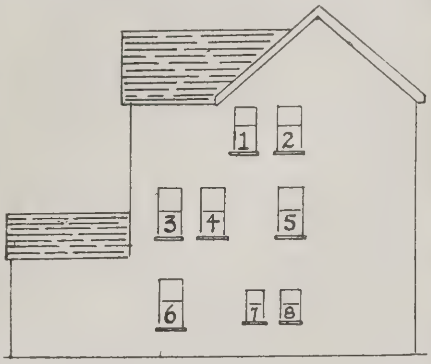
Freezing of Water in Acetylene Gas Generator.

X writes: "What methods are available to prevent the freezing of water in an acetylene gas generator (carbide to water), and how can the ice be released when the apparatus is frozen?"

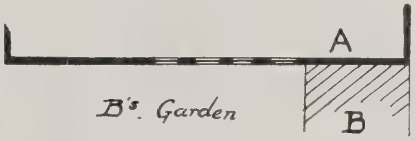
In answer to this enquiry, Messrs. Strode & Co. send the following reply:—"Protection can, of course, be afforded by covering the generator with hair felt or non-conducting composition. In any case, the generator should be fixed in a proper shed or outbuilding constructed to give ample protection. Where it can be conveniently arranged, a hot-water pipe carried through the generator house would be an advantage. A gas lamp fixed outside the generator house, with a flue-pipe from the lamp carried through the generator house, has also been found to answer well. The flue must, of course, be perfectly gas-tight. With regard to releasing the ice when the apparatus is frozen, we can only suggest melting the same with hot water."

Right of Light and new Windows.

PREMISES writes: "A built premises eighteen years and a-half ago right up to the boundary of B's property. There were two old windows on the ground floor in A's old premises, but these have been done away with and placed (as shown by the sketch below) in a different position above the old ones on the next floor. Nos. 1 to 5 are new windows. There were none in the same position in the old building. No. 6 is an ancient light. Nos. 7 and 8 were old windows in the old premises, but not replaced. (1) Has B a right to build against these new windows? (2) Can A now replace windows in the same position as the old ones and retain the ancient lights? (3) Can A put extra windows above the old? (4) Can B charge A for removing window sills projecting over on his premises belonging to A if A refuses to do so himself?"



Elevation of A's Property



Entirely different lights cannot be substituted for "ancient lights" unless by arrangement. (1) B possesses the right to build right up to his boundary and in front of A's windows, until after the statutory period (practically nineteen years and a day), after which the new windows become ancient lights themselves. (2) A cannot now repair his mistake; he has lost his "ancient lights" entirely. (3) A has no right whatever to open more windows, and his neighbour can at once block them (upon his own property, of course). (4) B can remove the source of trespass and can legally cut off the projecting window sills, but I doubt whether he will find it worth while to try to recover so small an outlay; he must, in fact, be very careful in doing it at all. No. 6 on your sketch appears to be the only window for which A can claim the privileges of an "ancient light." F. S. I.

ARCHITECTURAL DIS-ORDERS COMPETITION.

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The competition is divided into two parts—the first appealing mostly to students and practitioners of architecture and the second more especially to those practically engaged in constructional work. The most valuable prize will be given for the highest number of correct solutions of all the pictures in both divisions, but the rest of the prizes will be allocated to two classes, so that every reader will stand a chance of winning a prize.

As regards division A (architecture) we would call attention to the fact that a number of the questions will directly relate to the Orders of architecture, these being wrongly drawn in some way or other: and in solving these questions it will be found very useful to refer to the series of articles published recently in our columns under the title of "Practical Notes for Architectural Draughtsmen," by Messrs. Alfred W. S. Cross and Alan E. Munby, which series is being separately published as plates for use on the drawing-board.

The pictures in the "Architectural Dis-Orders Competition" will be published each week for 26 weeks in THE BUILDERS' JOURNAL, the first, second, third and fourth sets have been given in the issues for February 6th, 13th, 20th and 27th respectively, and the fifth set in this issue.

Competitors may send in as many sets of solutions as they please, provided they are in accordance with the conditions.

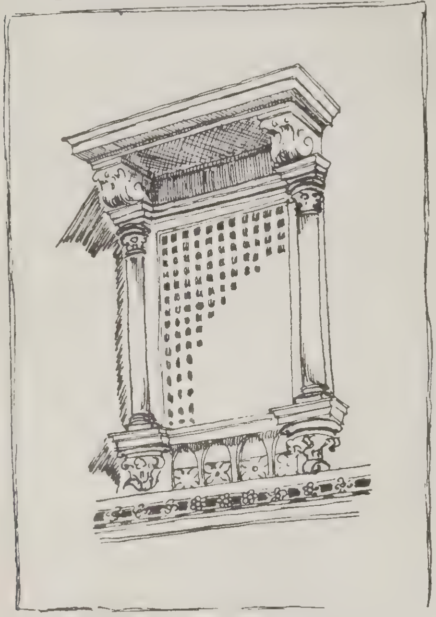
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Fifth Series.)

CLASS A (ARCHITECTURE).



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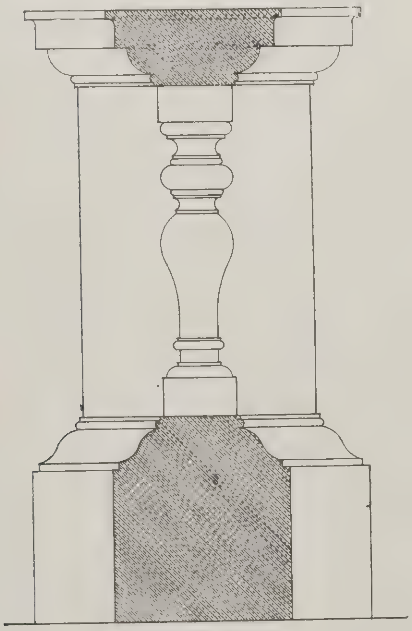

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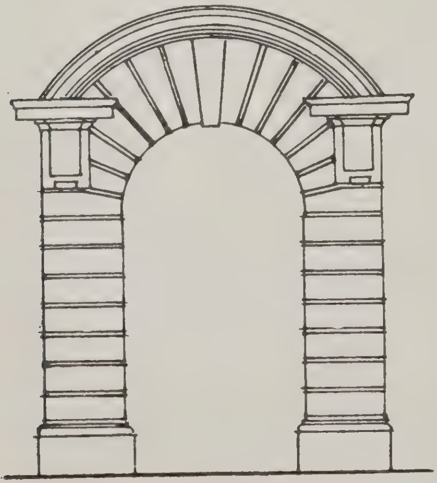


A 15

THE PRIZES.

£20, and 50 other valuable prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions to the question "What is wrong?" in relation to each of the drawings published in the "Architectural Dis-Orders Competition." The winner, or winners, of this special prize will not be eligible for any of the other prizes offered.

The remainder of the prizes are divided into two classes, as follows :-

Class A (Architecture).

1st Prize.—£10.

2nd Prize.—Morocco leather pocket case of German silver instruments, comprising 5-in. sector-jointed compass, with double knee-joints, hair spring attached to the divider leg of compass, nut and bolt needle points, pen and pencil legs, lengthening bar, set of three spring bows, ruling pen.

3rd Prize.—Leather case of instruments, containing 4-in. German silver bow compass, hinged pen and pencil points, needle or lead holder, and handle to take pen or pencil leg.

4th Prize.—Leather case of beam compasses, with tangent screw adustment, and needle points (electrum).

5th Prize.—Architect's pine drawing board, grooved, with mahogany battens, brass slots and screws to allow of contraction. One edge inlaid with ebony. Size 28ins. by 21ins.

6th Prize.—A morocco pocket case containing an English set of three spring bows, with steel heads and steel points (divider, pen and pencil).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case containing 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

9th Prize.—A brass proportional compass, 6-in., partly divided.

10th Prize.—A pocket divider, electrum.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

Class B (Building).

1st Prize.—£10.

2nd Prize.—Abney level in morocco case, with 5-in. rack and vernier.

3rd Prize.—Best English-made electrum *Napier* pocket compass.

4th Prize.—A drawing set, comprising drawing-board (size 23ins. by 16ins.), 24-in. T-square, 2 large set-squares, and set of instruments in rosewood case, comprising 4-in. brass divider, needle-pointed compass with pen and pencil points, bar, patent pencil point, slip rule, &c.

5th Prize.—A pair of builder's rods, spring-jointed.

6th Prize.—A pair of builder's rods (not jointed).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, contining 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, and 6-in. diagonal scale.

9th Prize.—Spirit level, 15ins., brass-faced.

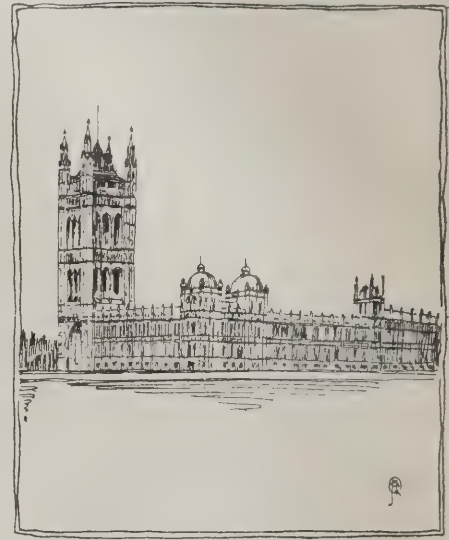
10th Prize.—2-ft. fold-up boxwood rule, brass-jointed, fully divided, 4 bevels.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

(For Coupons see page xxviii.)

Copies of "The Builders' Journal" *in which the first, second, third and fourth series of pictures appeared can now be obtained from the Publisher. The dates of the issues are February 6th, February 13th, February 20th and February 27th respectively*

CLASS B (BUILDING).



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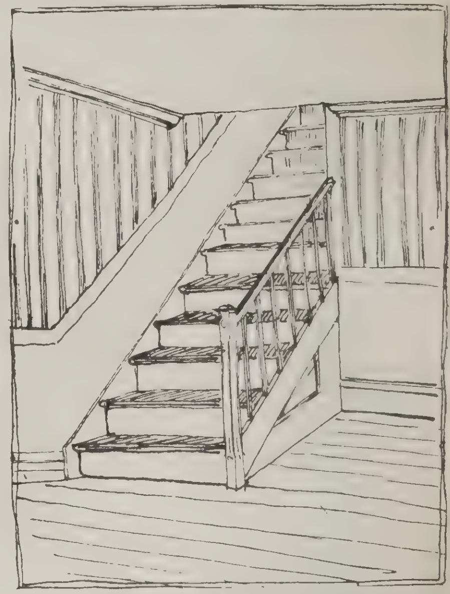

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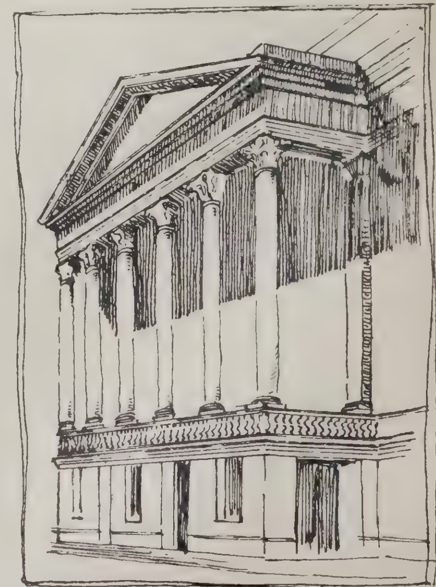

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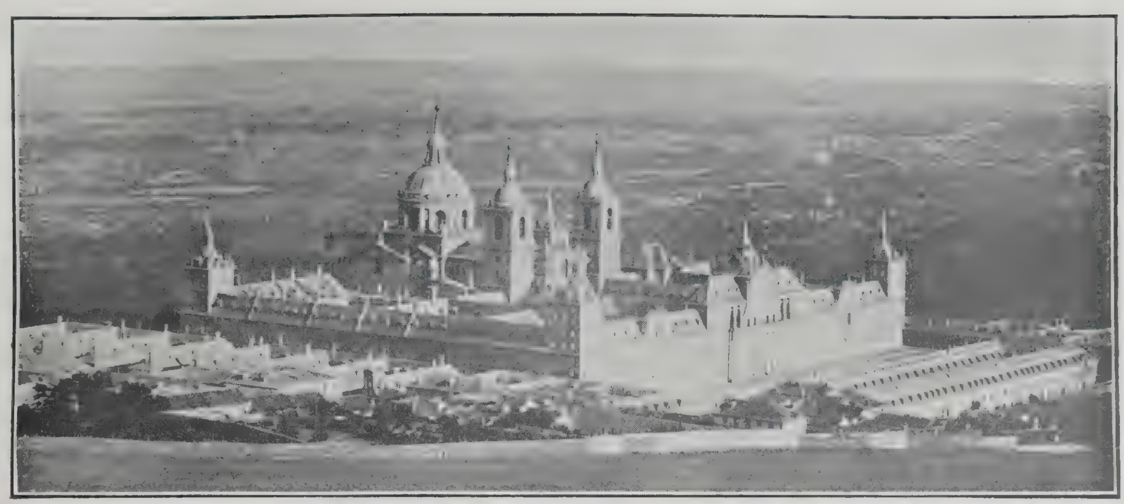
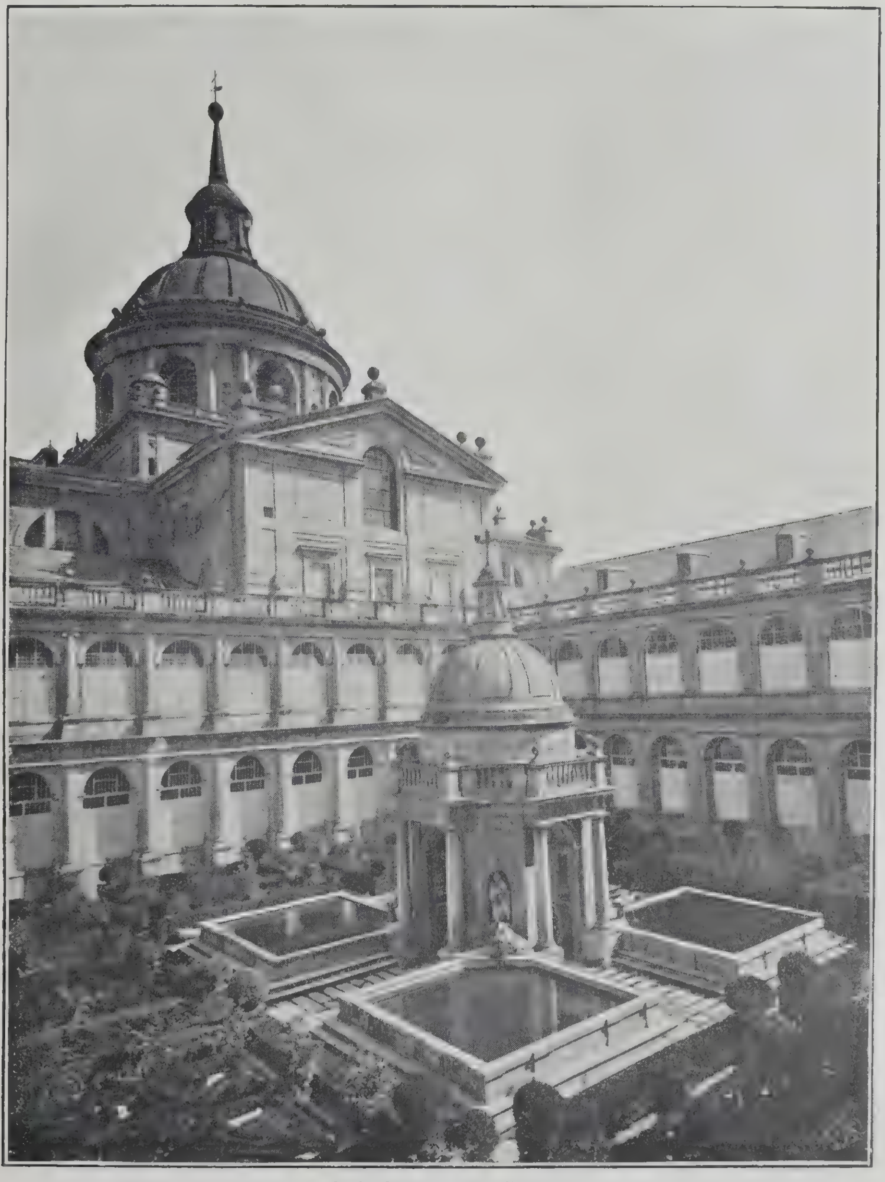
Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, March 13th, 1907.



General View.

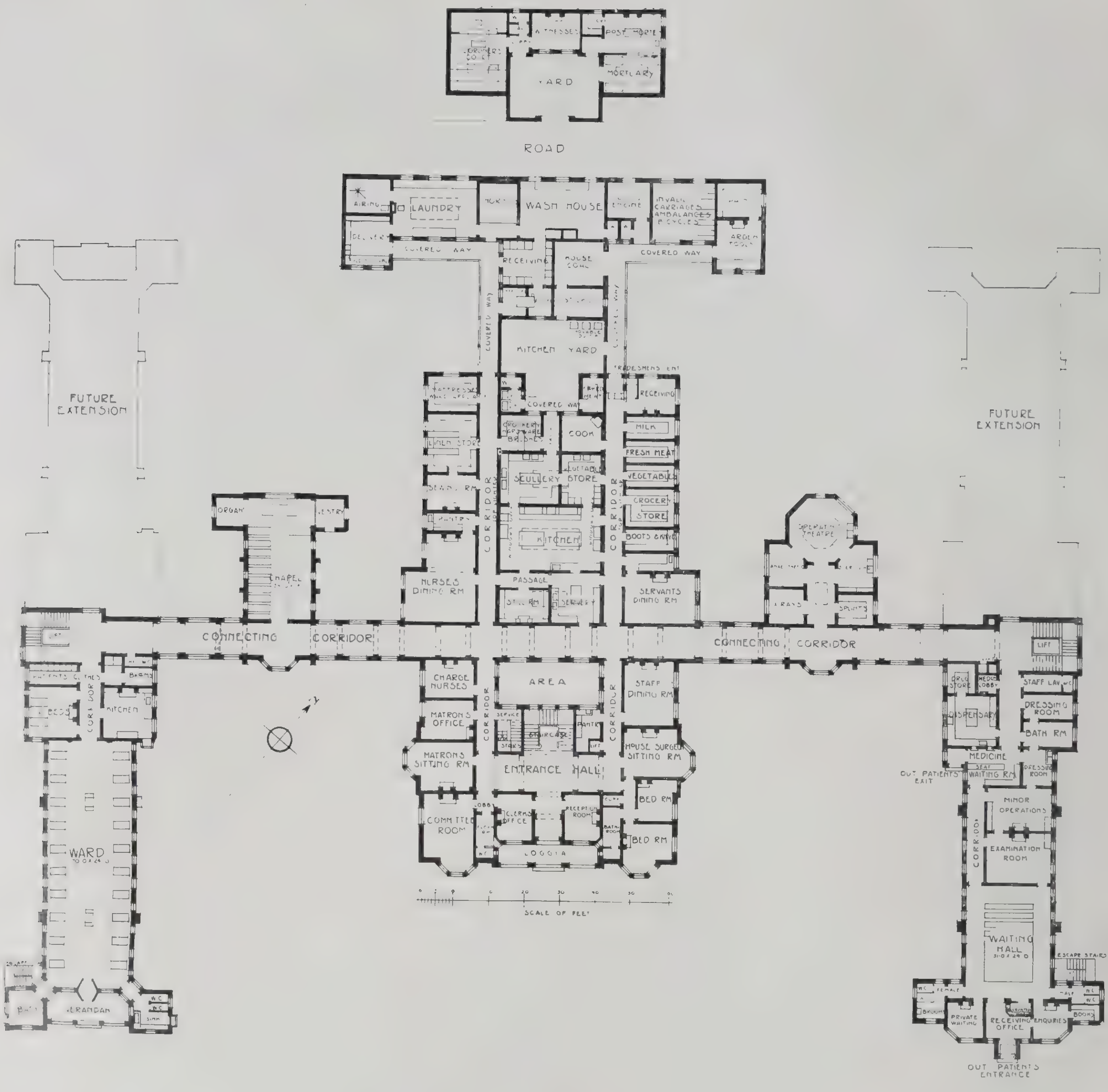


Patio de Los Evangelists.

THE ESCORIAL. HERRERA, ARCHITECT.

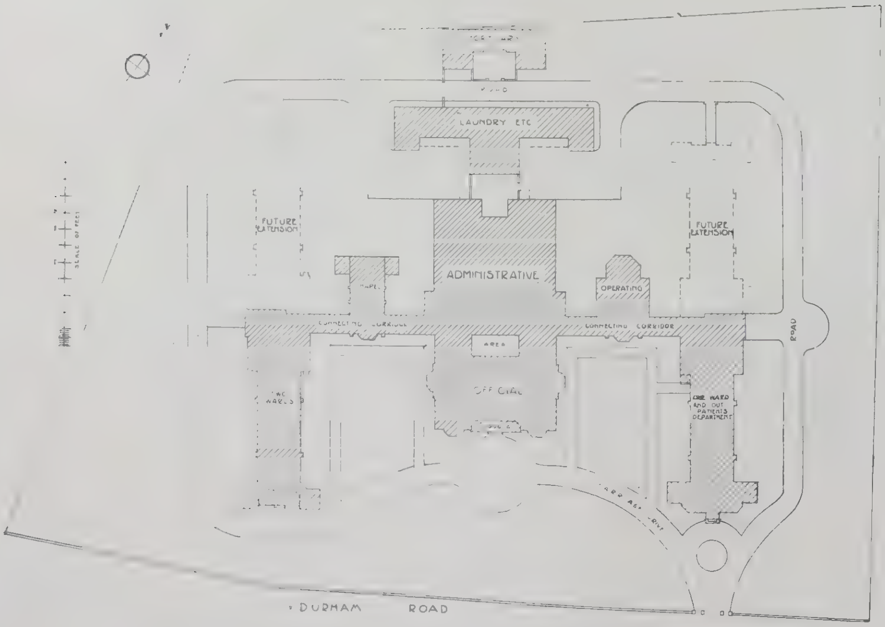
(Illustrations accompanying Mr. Prentice's paper on "Spanish Architecture."

Supplement to
The Builders' Journal and Architectural Engineer;
Wednesday, March 13th, 1907.

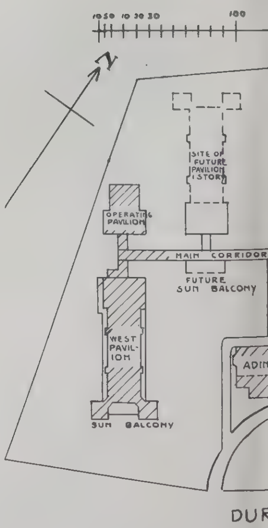


Ground-Floor Plan.

First-Premiated Design.



Block Plan of First-Premiated Design. Armstrong and Wright, Architects.



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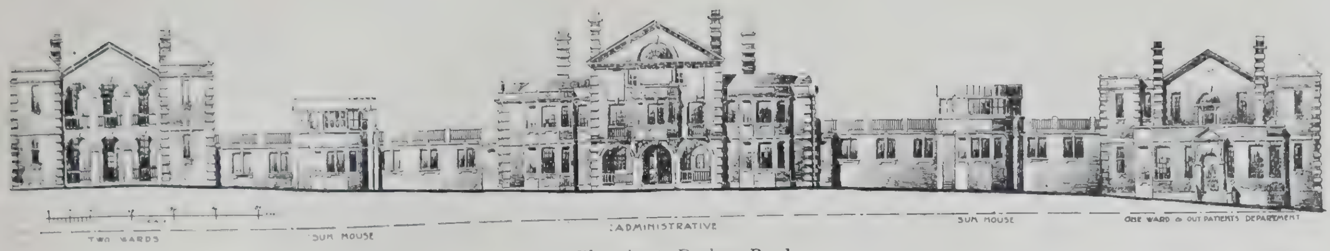
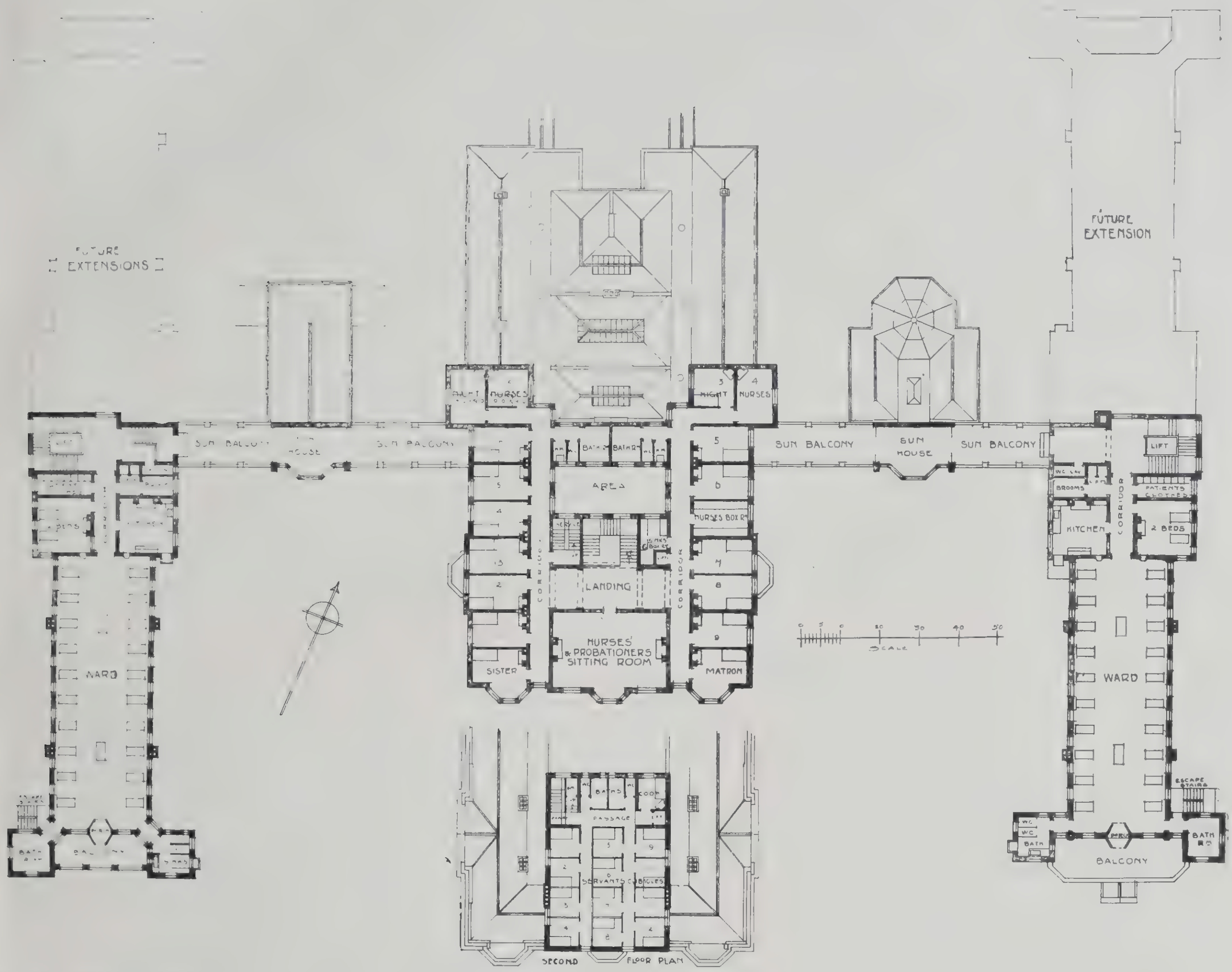
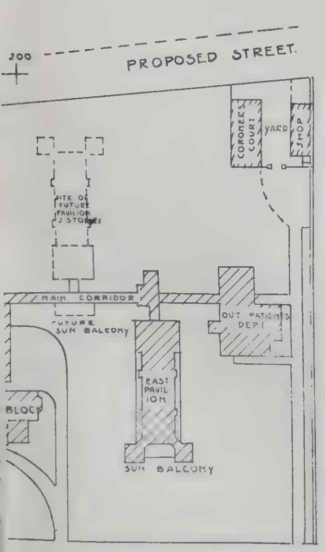


Front Elevation to Durham Road.



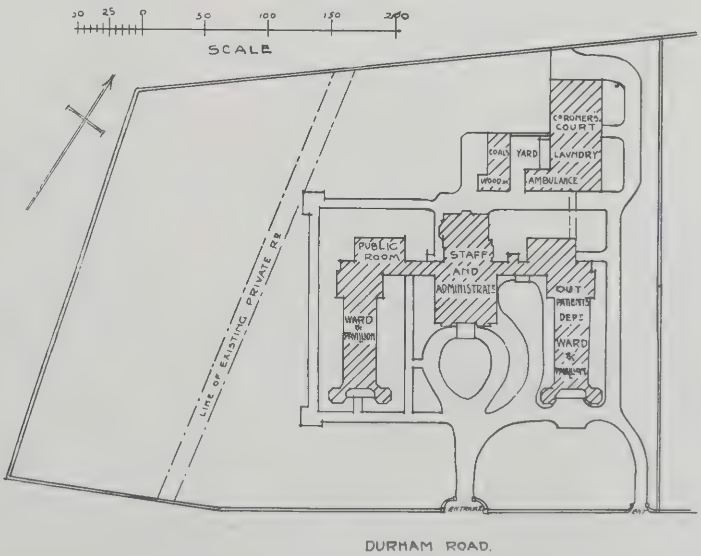
rong and Wright, Architects.

First-Floor Plan.



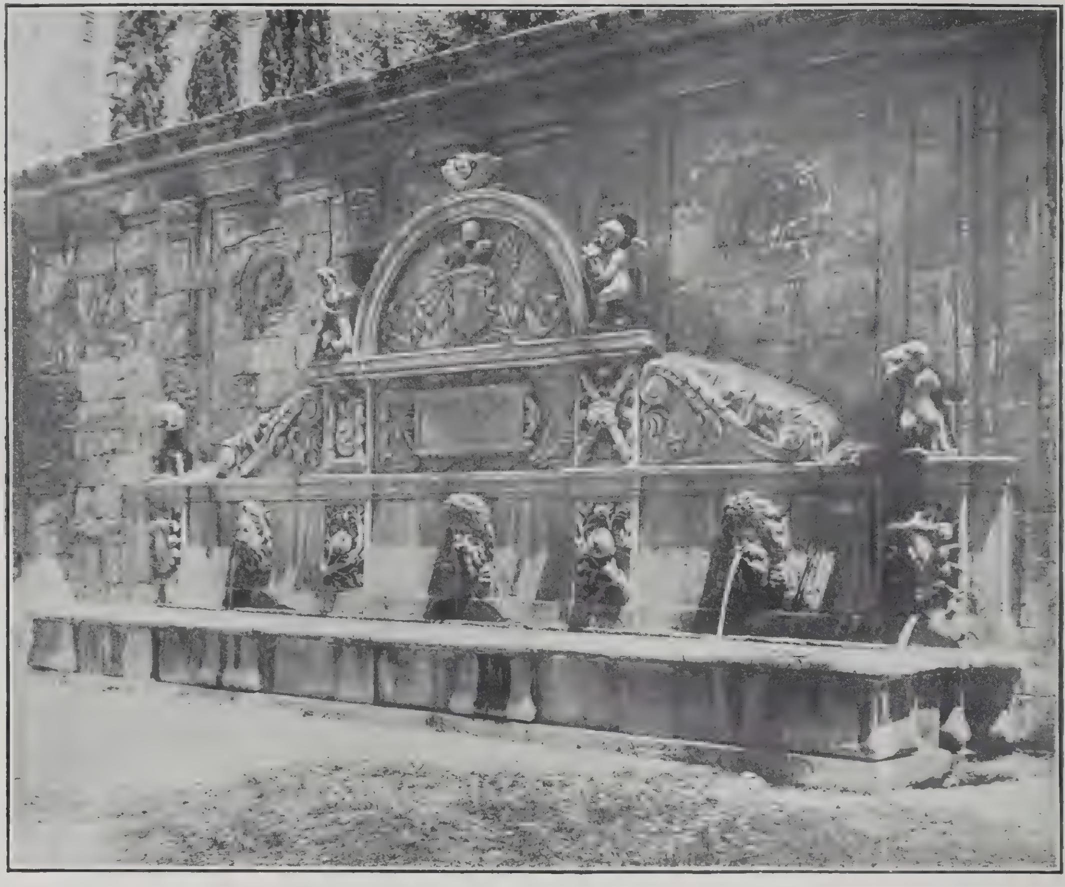
on and Houston, Architects.

SUNDERLAND.

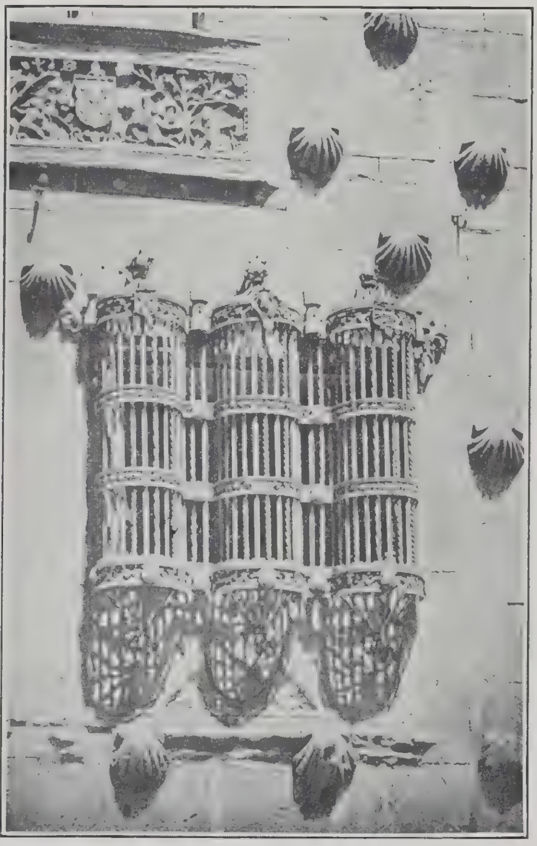


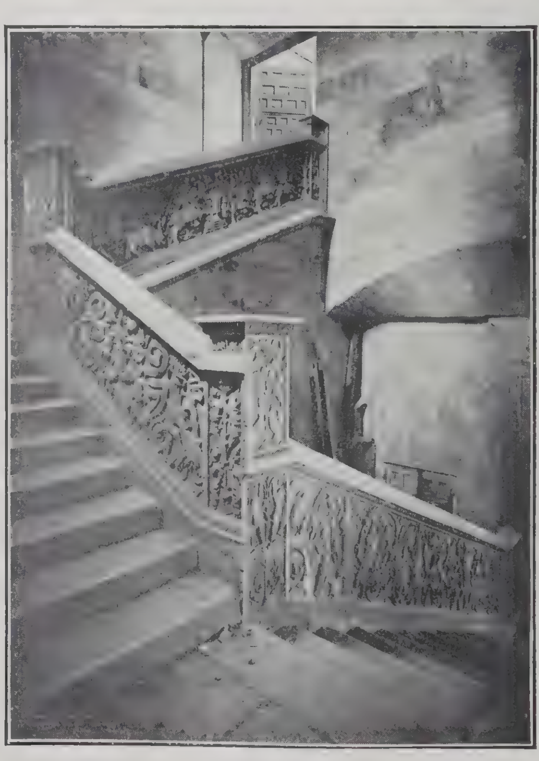
Third-Premiated Design. Henman and Cooper, Architects.

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, March 13th, 1907.



CHARLES V.'S FOUNTAIN AT THE ALHAMBRA, GRANADA.





STAIRCASE IN THE UNIVERSITY, SALAMANCA.

GRILLES COVERING WINDOW, CASA DE LAS CONCHAS, SALAMANCA.

(*Illustrations accompanying Mr. Prentice's paper on "Spanish Architecture."*)

March 13, 1907. Volume 25, No. 631

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

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The "**Fire Supplement**" is given in this issue.

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Irish Architects and Builders at Loggerheads.

EARLY in 1903 the Royal Institute of British Architects adopted a set of conditions for building contracts which was approved by the master builders of England. Recently it was announced that the Royal Institute of the Architects of Ireland had brought forth a set of their own. We have received copies of communications that have passed between the Master Builders' Association of Ireland and the Irish Institute with reference to the former body's dissatisfaction with the action of the latter. The secretary of the Master Builders' Association, in a letter dated January 5th, referred to the fact that ever since 1898 the Irish Institute of Architects have had under consideration the adoption of a uniform set of conditions for use in Ireland. Communications passed between the architects and builders from time to time, but the R.I.B.A. in 1900 also considering the adoption of a uniform set of conditions, led the matter to be postponed. When these English conditions were adopted in 1903 the Council of the Irish Institute recommmended their adoption for the whole of Ireland, but this was not followed, and the matter was referred to a sub-committee of the Council with instructions to draw up a set of conditions to be used tentatively until some experience of the working of the new R.I.B.A. conditions had been gained. While this sub-committee was still persuing its labours these new English conditions were being used extensively and were found to work so satisfactorily that the Secretary of the R.I.B.A. in February, 1905, when the conditions had been almost two years in use, wrote to the Irish Institute pointing out the desirability of extending their use to Ireland. However, the conditions prepared by the above-mentioned sub-committee were approved by the Irish Institute Council on December 4th, 1905, and sent forward for adoption by the members. The Irish Master Builders' Association as soon as they heard of it wrote on January 11th, 1906, protesting against the adoption of the conditions, on which their opinion had not been obtained nor their interests in any way considered. On January 26th, 1906, a copy of the proposed conditions was sent them and the various associations of Master Builders throughout Ireland began their consideration of the details. Some 16 weeks after this the members of the Irish Institute adopted the conditions, to the amazement of the Irish builders, who pointed out that if the Institute sub-committee required 18 months to prepare the conditions, 16 weeks was no undue delay on their part. On March 4th the Master Builders' Association wrote stating that in order to correct or confirm the opinion already received on these conditions, the matter had been submitted to the Right Hon. James H. Campbell, K.C., M.P., and enclosing a copy of his opinion. This was very strongly phrased. Mr. Campbell says, indeed:

> In my opinion the scope and effect of the Form of Contract adopted by the Irish architects is an outrage upon justice and commonsense. The result of clause 13, paragraph 2, would be to leave the builders at the mercy of the architects upon every conceivable question, including the most serious matters of difficult and complicated law, except as to the quantities or prices of deviations duly ordered. In fact, this contract would oust altogether the jurisdiction of His Majesty's Courts of Law and place querists outside the pale of the law, save in the very exceptional case in which they could prove fraud or misconduct on the part of the architect. Querists should resolutely decline to tender upon this form, and I feel certain that public opinion will endorse their action.

It certainly seems to us that the members of the Irish Institute have been ill-advised to depart from the R.I.B.A. conditions and adopt a set of their own, and that those who have been responsible for its compilation and have led the members of the Irish Institute astray have certainly taken up a most unfair attitude.

New, True, or Neither

Perhaps the earliest instincts of the budding architect with antiquarian leanings is to take unto himself heelball and lining paper, to seek the nearest brass, and straightway to rub it, "with both hands earnestly." And very entertaining and informing it is. The combination of architect and brass rubber is not unreasonable, particularly when we find that Thomas and Joshua Mann, of York, combined in the seventeenth century the noble profession of architect with the perhaps less distinguished trade of engraver of monumental brasses. Anyhow, it helped to make up the 5 per cent. which raised such lyric ecstasies in the breasts of the A.A. playwrights. But all this, and more of poignant interest to "brass" enthusiasts, may be found in Mr. Macklin's new book on "The Brasses of England"—a very delightful book.

* * * * *

I have culled the following from the "Weekly Times and Echo," which professes to quote from the home letter of an English bricklayer employed in a Canadian town one hundred miles north of Montreal:

> One day it was 48 degs. below zero, and that stopped the job. We had furnaces on the scaffolding that held about three bushels of coke, standing 8ft. apart, and the mortar was made with boiling water. The bricks had a steam jet playing upon them, and by the time you lay three bricks they are all frozen. Then you have to poke your trowel into the fire to melt the frozen mortar before you can lay any more. I had to cut my moustache off because it used to freeze into a lump of ice.

I note that the mercury in the thermometer would have been frozen before it could register 48 degs. below zero, and pass on to express the opinion that if the climate of Canada is remarkable for exploits of frost, it is even more remarkable for producing exploits of narrative.

* * * * *

I know a traveller who was told by a member of the Canadian Frontier Police that when out on patrol duty in winter and their watches were all frozen, they had to rely upon the burning down of a candle to measure the times for changing guard. One night a man grew mutinous at not being relieved. Suspicion fell on the candle. It was examined and found to be frozen solid, flame and all.

* * * * *

It is an odd thing that the section of the building trade which is always taken by the cheap humorist as his butt is the plumber.

For the life of me I cannot see why this harmless and necessary tradesman should so monopolise the wit of the halfpenny illustrated press.

Since, however, they are so swift to see invisible jokes at the plumber's expense, I marvel that the screeds that have been written about St. Paul's have not reminded us that the burning of Old St. Paul's began through a plumber's bad work. The fire first seized on the end of a board that was laid on a roof instead of lead, the lead having broken away, and thence spread.

Curiously enough, we learn from Rugge's "Diurnal" that the first brick laid after the Great Fire was in Fleet Street at the house of a plumber to cast his lead in. So, if the plumbers made haste to destroy they were at least swift to make good.

* * *

The plumber is often represented as being of a melancholy cast of mind—saturnine, in fact, Saturn being the planet who looks after lead. In classical Rome, however, as we learn from the lists of plumbers that have survived, the employees of the Roman Metropolitan Water Board were a jovial crew. The following are authentic names, and I have appended to each the probable causes of their emotions:—

THE HAPPY ONE, "Please m'm, the water is running down the stairs."

THE FORTUNATE ONE is sent for to mend the burst pipe.

THE SKILFUL ONE mends it, slowly but not too surely.

THE FLOURISHING ONE sends in his little bill.

THE HILARIOUS ONE gets it paid without comment.

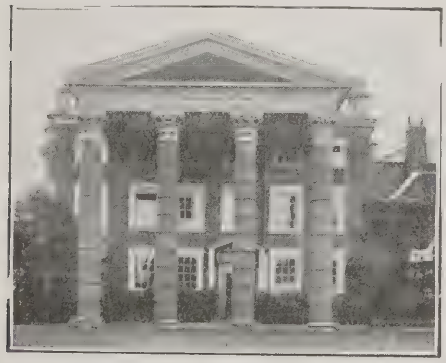
OF BEAUTIFUL FORM—well, this must have been a pre-incarnation of Mr. Bankart.

* * *

You may think I am pulling the corporate leg of the readers of THE BUILDERS' JOURNAL, but I am not. You can read all about it in the MS. of Frontinus on the Water-Supply of Rome, preserved in the Monastic Library at Monte-Cassino.

* * *

The lay press seems to have been vastly impressed by the sense of economy and almost archæological continuity exhibited by the War Office in moving into the new building from Pall Mall not only the sofas but even some of the mantelpieces. But surely this is very small salvage compared with the queer case of a porch now illustrated.



HENDON HALL.

This striking feature of Hendon Hall is probably the most peripatetic porch on record. The tympanum and capitals were originally part of the porch of Canons, the residence of the Duke of Chandos at Edgware. When Canons was destroyed, about 1750, the porch was set up again at Wanstead, and when it for the second time fell to the destroyer, it found a resting-place at Hendon Hall. Altogether a rather notable record of travel.

THE LOOKER-ON.

THE ARCHITECTURAL ASSOCIATION.

Mr. Prentice on Spanish Architecture.

A meeting of the Architectural Association was held at 18, Tufton Street, Westminster, on Friday evening, the chair being occupied by Mr. Louis Ambler.

Mr. A. N. Prentice, F.R.I.B.A., read a paper on "Spanish Architecture." He confined his remarks to that period of the architecture of Spain which had its birth about the time of the expulsion of the Moors from Granada, a period during which architecture flourished with extraordinary grace and exuberance, and finally developed into a more severe and dignified form under the patronage of Philip II.

The Moors first set foot in Spain in A.D. 710, and occupied the Peninsula for upwards of 800 years; and after the conquest of Granada their workmen carried on the Moorish tradition under their Christian masters in buildings of the early Renaissance period.

On the discovery of the New World (in 1492) Spain was in a position to undertake the production of costly works of art. About this time great events were happening in Europe. Italy had found in the volumes of the ancient classic writers a new field of mental culture. Spaniards flocked to Italy to study at the universities, and they returned later to their own country enthusiastic pioneers in an altogether fresh interpretation of art. This, then, was the artistic atmosphere into which Spaniards emerged at the conquest of Granada.

The invasion of the Peninsula by foreign artists was hailed with satisfaction by the Spaniards themselves, who had naturally a predilection for rich and realistic ornamentation. Spanish sculptors who had studied in the studios at Rome also took part in the movement, and, in company with architects and goldsmiths, created the new style which was nicknamed "The Plateresque." The name seems to have been conveyed from the notion that its surface-ornamentation and arabesques resembled the carefully-chiselled work of the silversmiths.

The rich effect of this style carried out by some of the early artists is dazzling. It is almost a misnomer to call it by the title Renaissance. Such plastic treatment had already been adopted by the late Gothic artists, and the new birth was simply a change into classic detail of Gothic ornament.

The Cathedral of Granada.

This was one of the first great works to be erected in the Plateresque style in the south of Spain. Enrique de Egas, who was first commissioned to design the building, prepared plans for a Gothic structure, but in 1525, for some unknown reason, the Chapter transferred the carrying out of the building to Diego de Siloe, who no doubt conceived the idea of transforming the Capilla Mayor into a circular form some 70ft. wide and surmounting it with a dome 155ft. high. The effect of this large open space immediately over the high altar is exceedingly grand and imposing.

The plan shows a nave with double aisles, flanked with chapels, and a *coro* encroaching on the nave, as is the custom in all Spanish cathedrals; the vaulting is at a height of about 100ft. Fergusson considers that in respect of its plan the cathedral of Granada is one of the finest churches in Europe.

The treatment of the west front is extremely massive and dignified, especially for a Spanish church of this period. It is said to have been designed by Alonso Cano about the year 1650.

Within the building, far the most interesting chapel is the Capilla Real, completed by Enrique de Egas in 1515, in the late Gothic style. It must have formed part of his original scheme, and was perhaps one of the first parts of the cathedral ordered to be built, as a sort of burial-chapel for the Catholic kings. On the death of Ferdinand and Isabella the Italian sculptor, Domenico Fancelli, was summoned from Florence to execute the Royal monuments. They are placed in the centre of the chapel, and are amongst the most magnificent mausoleums in Christendom. In front a few steps descend to the vault, in which lie the plain leaden coffins of the Catholic kings. Behind is the magnificent iron *reja*, by the famous ironworker Bartolomé of Jaen, dividing the burial-chapel from the rest of the building. Sir Digby Wyatt refers to this in his book as the best in design and the most imposing of Spanish *rejas*. The screen was produced between the years 1520 and 1530, and bears the inscription, "Maestro Bartolomé me fec."

The internal planning of the Spanish cathedrals lent itself most happily to the use of ironwork, and nothing like the richness and dexterity of these screens is to be found in other European countries.

The two great gilded screens in Seville Cathedral

are of even surpassing grandeur. That of the *coro* was wrought by Sancho Munoz, of Cuenca, in 1519, and was almost totally destroyed by the sad disaster to the building in 1889, when a portion of the vaulting fell in. The screen is 50ft. wide, and must be upwards of 60ft. high. The central mass is of twisted bars with large Corinthian pillars at intervals, of wood construction, sheathed with embossed metal work. A frieze of highly decorated work, comprising the heads of five of the Apostles in medallions, is surmounted by a heavily-moulded and fretted cornice, and above all by a cresting, representing the tree of Jesse, intermixed with figure and fine scroll-work, divided by towering candelabria.

Francisco de Salamanca, a Dominican friar, designed the superb *reja* to the Capilla Mayor, which faces the screen just described; it was begun in 1518 and finished by his pupil, Antonio de Palencia, in 1533. Of purely Plateresque design, it has three tiers of spindled balusters, divided by pillars sheathed in iron. In addition to the finely-modelled frieze, a low and equally rich border intersects the screen, while the cresting is a truly marvellous work. There is, in addition, a large panel, forming a central feature, with a representation of the Entombment, in embossed iron, comprising many admirably designed and quaintly-costumed figures.

Returning to the other cathedrals built under the Renaissance movement, Diego de Siloe was commissioned to build

Malaga Cathedral

in 1538. The work progressed but slowly, and in 1680 the building was partly destroyed by an earthquake; but in 1719 the work was again resumed, and progressed at intervals. The interior is very similar in design to that of Granada, and is built entirely in white limestone. Here also the choir blocks up the centre of the nave, but the general effect is very imposing.

Jaen Cathedral.

This is another important work of the period, begun in 1532 by Pedro de Valdelvira, on the site of a Gothic church. It has a fine west front, flanked by two towers 200 ft. high.

The South having led the way in introducing the Renaissance style into their churches, the clergy in the North soon followed their example. Diego de Deza, Archbishop of Seville, had already founded the church of

San Domingo, Salamanca,

and to this he added a Renaissance facade thoroughly characteristic of the period. On entering the church the space over the doorway is found to be occupied by the choir, supported on a wide elliptical arch. The practice of placing the choir over the west entrance is a peculiarity of Spanish planning, and seems to have been common to churches connected with monastic buildings.

Within a stone's throw of San Domingo, and facing its western facade, stands the new cathedral of Salamanca, begun in 1515 from the designs of Juan Gil de Hontanon, in the late Gothic style, and which probably had not finished building when the Escorial was commenced. This fact is mentioned because it is interesting to note that, although buildings with Classic detail were very much in favour after the end of the 15th century, the Spaniards still loved their beautiful Gothic style, and continued to erect many Gothic churches long after the cathedrals of Granada and Malaga were begun. Segovia Cathedral might be cited as an example.

However, the Renaissance movement continued to spread farther north, and we find Plateresque features freely introduced into the lofty dome, or lantern, of Burgos Cathedral, which replaced the prior one that fell in 1539, and again at

The Convent of San Marcos, Leon,

the masterpiece of the architect Juan de Badajoz. This convent, founded in 1168 for the knights of Santiago, was rebuilt in 1514, and is a most beautiful and perfect example of the early Renaissance. The extensive building forms an oblong, and is composed of the church to the east, with the monastery filling the rest of the space. The facade is decorated with pilasters and friezes of charming execution, and the graceful festoons and delicate carvings are remarkable. The interior of the church is lofty, with late vaulting, but, having been disused for many years, is devoid of furniture or decorations, save the beautiful stalls dating from 1541.

During Charles V.'s reign many more churches were added to in the Plateresque style, and it was not till after his abdication, and under the rule of Philip II., that homage was paid to the chinque-cento style in its severest form. The plastic art seems to have lost favour, and ornamentation was eschewed. Architects and sculptors returned from Rome under the influence of Michael Angelo and Vignola. The taste for grotesque sculpture changed into a more severe and Classic form. This second period of the Renaissance is commonly known as

The Herrera Style,

called after Juan de Herrera, the great architect of the Escorial. Herrera originally studied in Belgium, and accompanied Charles V. throughout his campaigns in Italy, and was no doubt employed on designing fortifications, as was the custom with architects in those days. On the Emperor's return to Spain, Herrera did some work at the Alcazar at Toledo, but the Court finally settled at Valladolid, and the next important work entrusted to him was to prepare designs for

Valladolid Cathedral.

Herrera recognised that he had a superb chance, and set to work to design an edifice which, in his own words, was to be a *todo sin iqual*. The church had already been begun in 1527 by Riano, and carried on by Hontanon and others, but Herrera formed new plans and destroyed what had been already built, with the intention of erecting a monument bearing the character of the new style which he had studied in Italy. He prepared a magnificent model, which is still preserved, showing a church consisting of a nave and choir, furnished with aisles and separated by a dome-covered transept; both sides were to be flanked with rows of chapels, and there were to be four towers at the corners. The building, however, was partially built, and the only completed tower fell in 1841. The interior is 402ft. long and 207ft. wide, and although exceedingly bare, is most impressive. The exterior also is very impressive as seen from the narrow street leading up to the western facade, which is upwards of 170ft. high. The Doric treatment of the lower storey is extremely grand and simple, and the deep arch forming the entrance, 24ft. wide by 50ft. high, adds much dignity to the whole.

Herrera's brilliant idea of planning a large cathedral with a central dome and four corner towers was adopted 100 years after, when the great Church of the Pilar at Saragossa was begun by Herrera el Mozo, but unfortunately, as in the case of its prototype, only one of the angle towers has been completed, and we have therefore to fall back on our imagination to realise what an exceptionally fine effect these four towers would add to the already picturesque grouping of this church seen from the banks of the Ebro.

Towers were in much favour with the Spaniards. The student will find most beautiful examples throughout the length and breadth of the Peninsula; and, in particular, there are the famous towers of the Giralda at Seville and the Torre Nueva at Saragossa, which latter, like the Seville example, was enriched externally with delicate Moorish raceries, formed in brickwork.

The Escorial.

We now come to the Escorial. Mr. Prentice said that architectural taste at the present day was somewhat more in accord with the traditions which led to the production of this mighty building, and architects were more disposed to favourably criticise its design and construction. But few buildings of the importance of the Escorial had been more universally maligned by the general critic. It had not only been pronounced a failure, but also considered devoid of any artistic merit. Even the late Mr. G. E. Street did not deem the Escorial worthy of a visit, as indeed, being a great Revivalist, his sympathies were entirely opposed even to its consideration. He refers to it thus "As far as the building is concerned it is enough to know that Herrera designed it, to be satisfied that it will be cold, insipid, and formal in character, and the glimpses I had of it as I passed in the train amply justified this expectation." No doubt, said Mr. Prentice, this vast structure, stripped of most of its furniture and ornamentations, and deserted by the thousands of people who formerly thronged its apartments, cloisters and courtyards, strikes the ordinary visitor as being most depressing, but to the architectural student the study of the structure should be of intense interest. The masterly way in which the building is executed, the jointing of the granite work, the manner of vaulting the large areas, the means of carrying water off the roofs, the underground vaults, and finally the elaborate system of conduits and ducts for supplying the building with water, are all subjects worth investigating. After a careful consideration of its purpose, one can only come to the conclusion that the building has never been properly understood.

Philip II., that stern but deeply pious monarch, who looked on the world with a mind tainted with melancholy, founded the Escorial as a temple, a cloister, and a tomb, not as a pile built for ostentation and show. His object was to carry out the will of his father, Charles V., in constructing a royal burial place, as a solemn act of gratitude to the patron saint St. Lawrence for securing him the victory at the battle of St. Quintin, on whose day it was fought. For about two years he searched for some spot in the vicinity of Madrid possessing the desired quality of solitude, and at last fixed on the wild, rocky, and scantily-wooded slopes of the Guadarrama, a suitable frame and background for such a structure, which seems to form as it were a part of the landscape in which it is set.

The building forms a rectangle measuring about 680ft. long and 530ft. wide. Mr. Prentice said that on reading the many authorities on the subject, one was perplexed at the great divergency of opinion in respect to its size; no two authorities seemed to agree as to its height, length or breadth; he had therefore taken some trouble to prepare a plan to $\frac{1}{8}$th scale, so as to convey some idea of the vast proportions of the building.* He considered the plan to be one of the finest ever created by man, and well worthy to rank with that of the baths at Caracalla or the Palace of Diocletian at Spalatra, which latter it equals in general dimensions.

The architect first entrusted with the design was Juan Bautista, of Toledo, who had studied in Naples and Rome, and was summoned by Philip in 1559 to prepare the plans. In 1563 the first stone was laid, and the building was pushed on rapidly till its completion, 21 years after, while the cost was probably equal to about £10,000,000 of our money. Perhaps the true designer was Philip himself, who was a man of great and simple taste.

The characteristics of the Escorial are beautiful grouping of towers, large proportions, admirable harmony and simplicity of design, massiveness and grandeur. It is almost impossible to put one's finger on any detail and say it is out of place or unnecessary. In the centre is the church with its great dome and two western towers, facing the large internal court known as the Patio de los Reyes. To the right is the convent, and to the left is the seminary; while the palace courtyard, a palace proper, lies to the east and north-east of the

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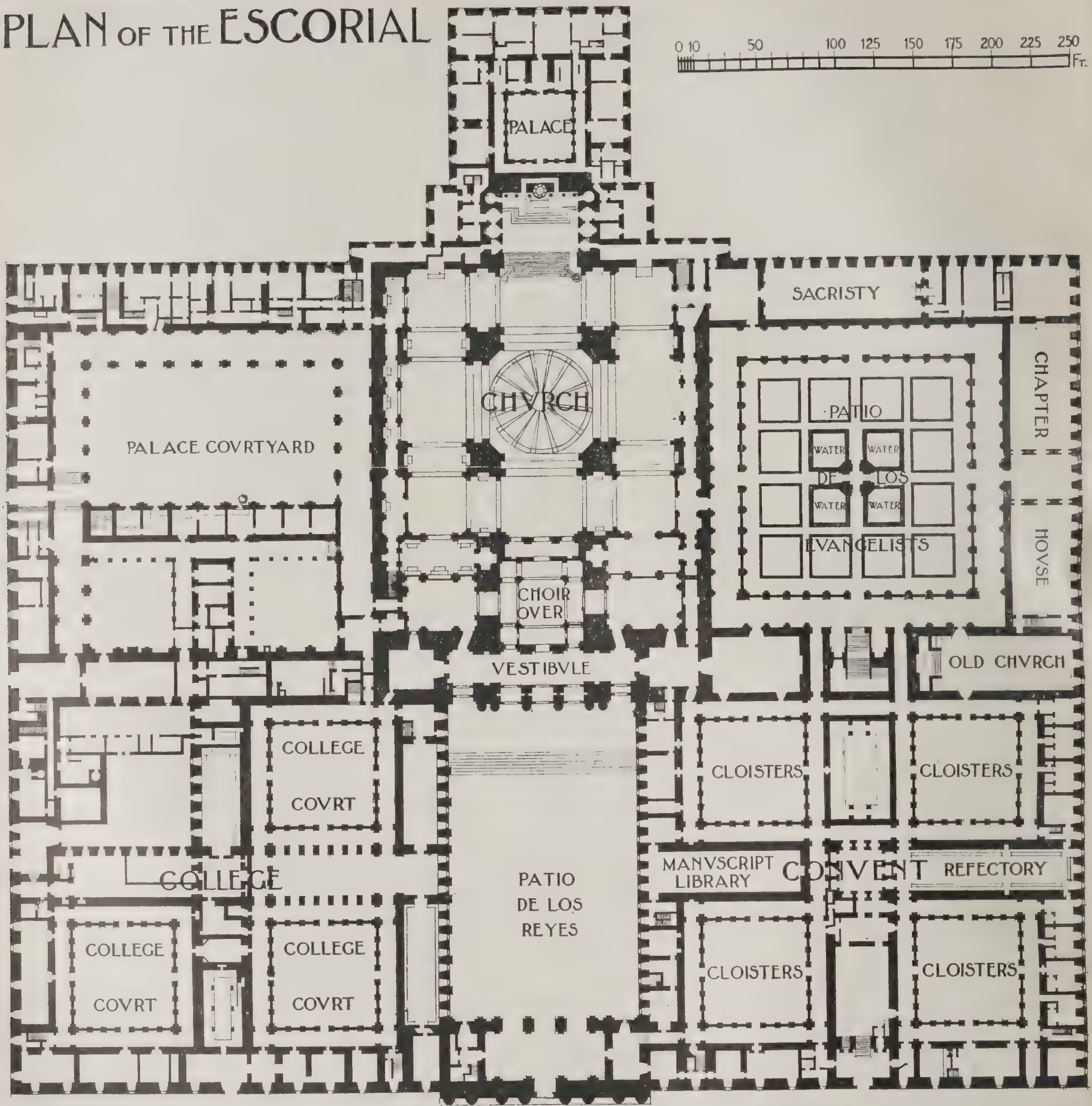
* Mr. Prentice's plan is 8ft. square! We give a reproduction of it on the next page.

PLAN OF THE ESCORIAL



church. The interior is divided into many courts, from the centre of which rise two smaller towers with slated roofs. In addition to this, four massive square towers mark the angles of the building. The west and north sides have a fine paved lonja or platform and are flanked by extensive ranges of out-buildings, built at great cost to provide accommodation for strangers. The block facing the western facade of the Escorial is called the Companna, of which the most remarkable feature is a spacious cloister 200ft. square.

A dreadful conflagration happened at the Escorial in 1671. It continued 15 days without intermission, during which much of the structure, together with four grand towers, fell; but the church, the royal apartments, the principal library, together with many paintings and pieces of furniture, were saved. The whole was rebuilt with superior magnificence by Charles II., to be again divested of many of its treasures by the French during the Peninsular War. Other restorations followed, but the interior still contains many beautiful objects of interest. The vaulting in the church is a triumph of stone construction, and the interior is really majestic: the screen is 93ft. high by 43ft. wide, of the four Orders, and is composed of red granite, precious jaspers, and gilt bronze.

The library of the Escorial is a noble apartment, about 170ft. long by 31ft. wide, the pavement of marble, and the bookcases of ebony, cedar and orange; in the centre are five large jasper tables, with smaller ones in porphyry, for the use of readers, while above all is an arched ceiling adorned with frescoes.

Of the 15 courtyards contained within the four walls of the Escorial, the patio of the Evangelists, a court 150ft. square, is the largest and most beautiful. Few courtyards in Italy can rival it for grace and beauty of classic proportion. It has four facades, composed of two rows of pillars, columns, and arches, making a total height of 60ft. In the centre is an octangular cymborium, 30ft. in diameter and 60ft. high. The outside is of beautiful stone, and the architecture of the Doric Order. Within, it is inlaid with jaspers and marbles of the richest kind.

Since 1885 the buildings have passed into the hands of a religious order who carry on the education of youths in the seminary to the north-west of the entrance.

Charles V.'s Palace at the Alhambra.

Previous to the erection of the Escorial, there were few royal palaces in Spain, with the exception perhaps of the Alcazar at Toledo and the Castle of Segovia. The Emperor Charles V. was a great soldier, and was much occupied abroad in wars with Italy, and with Francis I.; consequently he had little time for palace-building. He gave instructions, however, for a palatial addition to be built to the Alhambra at Granada, but this was abandoned and left unfinished a few years afterwards. The building forms a quadrangle 207ft.

square and 53ft. high. The interior consists of a series of rooms built round a large circular court about 102ft. in diameter. The proportions of this magnificent court are most satisfactory, and one cannot but admire the long unbroken line of the Doric colonnade, supporting a second stage of the Ionic Order of a lighter and more elegant proportion. It is seldom one sees a circular courtyard which is not spoiled by some excrescence or other. Probably Inigo Jones took his idea for the circular courtyard to his design for Whitehall from this charming Spanish example.

The Alcazar, Toledo.

Charles V. also made additions to the Alcazar at Toledo. In the year 1548 he employed Alonzo de Covarrubias and Enrique de Egas to design the northern facade. Here we have an introduction to the essentially Spanish feature of the upper storey being formed with an open colonnade, which gives a feeling of lightness to the whole design. Facing the entrance, and extending to the full width of the three central arches, the first flight of a magnificent staircase ascends to the upper cloister. It is one of the finest staircases in the world. The steps are each of one block of stone of enormous width, and the size of the apartment enclosing the whole is 100ft. by 50ft. In the reign of Philip II. this staircase was further added to, and finally completed by Herrera in 1561, who afterwards turned his attention to the southern facade, forming the external wall of the staircase in 1571-84. It is Doric with four stages decorated with pilasters.

Other royal palaces were erected by various Spanish sovereigns in later years, but these do not come within the scope of this paper. The most important were the palaces of Aranjues, San Ildefonso at La Granja, and the present royal palace at Madrid, built by Philip V. in 1737.

Town Halls.

There are many good specimens of municipal architecture of this early period in Spain, and the Casa Ayuntamiento at Seville is undoubtedly one of the best examples, although unfortunately restored and extensively added to on both sides. The interior contains some large rooms with decorated ceilings, and the Audiencia or Court of Justice is worth visiting, but perhaps the handsomest apartment of this nature in Spain is the Hall of the Audiencia at Valencia, which has a magnificent *artesonado* ceiling divided into 21 compartments, while the lower parts of the walls are carved with curious old frescoes, and below is a beautiful dado of coloured azulejos: in fact every available space of this apartment is highly decorated, and the effect is exceedingly charming; but the principal feature is the narrow gallery running all round the room, supported on Plateresque shafts, the interspaces below being filled up with coats of arms and busts of the Kings of Aragon. Mr. Prentice said there were other examples in Spain of rooms treated with open galleries in this manner, but he did not know of any other apartment in Europe which had so remarkable an effect as this noble room.

Mr. Prentice went on to speak of the Ayuntamiento at Saragossa (another civic building of the early Renaissance period, completed in 1551) and the Court of Justice at Saragossa (a building of the same character), and afterwards dealt with the Universities of Salamanca and Alcalá. At the end of the 15th century these were amongst the most celebrated in Europe. Salamanca ranked immediately after that of Paris and before Oxford and Bologna, but it has now dwindled into an ordinary college. A staircase in the interior is worthy of note, richly carved with foliage and curious reliefs, representing bull-fights of the 15th century. The return of the handrail at the angles is very ingeniously worked, but, with the exception of one or two rich doorways, these few examples represent the most important features of what is left of this once famous university. The buildings of the University of Alcalá de Henares, however, have been sufficiently spared to convey some idea of their size and importance in the days of its prosperity.

Hospitals.

The cardinal princes of Spain founded many large hospitals during the reign of the Catholic kings, who appear to have spent money on a lavish scale, judging from such examples as are in existence at Seville, Toledo, Valladolid and at Santiago.

Domestic Architecture.

It has been often asked, Where did the nobility and grandees of Spain live? Travellers have remarked the absence of palatial villas, such as we find in Italy, or in our own country, situated in parks and surrounded by beautifully laid-out gardens. The only reasonable answer would seem to be that the topographical nature of the country is unsuitable for country residences: a great portion of Central Spain being an arid desert. The Casa de las Conchas, at Salamanca, may be considered the most complete house in Spain of its period. The exterior is studded with stone shells, the heraldic badge of its owner; but perhaps the most interesting features are the iron grilles which adorn the mezzanine windows, casting deep shadows on the stonework, and adding greatly to the charm of the curious effect of sunlight on the building. The skilful manner in which these grilles are constructed is worthy of investigation. There are many specimens of late Gothic grilles and balconies to be found even in Renaissance building, but specimens of this particular form are exceedingly rare. The grille consists of three circular cages formed of twisted upright iron bars projecting boldly from the wall, bound together with horizontal bands of pierced work. The upper and lower bands are enriched with foliage, armorial bearings, and turrets of Castile and pilgrim shells of St. James. These massive specimens not only screened and protected the inmates, but excluded the glare of the sun.

Castles.

In conclusion, Mr. Prentice briefly referred to the castellated architecture of Spain, which, he said, was sufficiently important to merit a paper by itself, though it had not yet been properly investigated by modern writers. The Alcazar at Segovia was a fair specimen, but the structure itself is practically modern, having been rebuilt almost from the foundations after a disastrous fire in 1860. The remains of another fine Castilian castle exist at Coca, within ten miles of Segovia, and remains of an even larger castle at Alcalá, near Seville, and the Castle of Madina del Campo is also a good specimen.

In his closing remarks Mr. Prentice said there was much to be learned from the architecture of Spain, and he expressed the hope that more of our students would visit the Peninsula and learn something more of the architecture of a country perhaps the least visited in Europe.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
March 15	SECONDARY SCHOOL AT BISHOP AUCKLAND.—Premiums of £20 and £10 for 2nd and 3rd. Particulars from J. A. L. Robson, Secretary for Higher Education, Shire Hall, Durham. Summary in "Builders' Journal," January 16th.
March 28	LIBRARY AT FAILSWORTH (to cost £3,000). Premiums of £20 and £10. Conditions from H. C. Broome, clerk, Council Offices, Failsworth. Deposit, One guinea.
March 30	LIBRARY AT DUDLEY.—Limited to architects practising within 50 miles. Conditions from H. C. Brettell, town clerk, Dudley.
March 30	PRESBYTERIAN CHURCH AT ROKER, SUNDERLAND.—Premiums of £25 and £15. Particulars from George W. Bain, 46, John Street, Sunderland. Summary in "Builders' Journal," Feb. 20
April 2	EXHIBITION COTTAGES AT SHEFFIELD & NEWCASTLE. Particulars from Henry R. Aldridge, 45, Bank Street, Sheffield.
April 30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May 17	CENTRAL LIBRARY AT BIRKEN HEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable it conditions sent back within a fortnight, in the event of the architect deciding not to compete.
No date.	SCOTTISH NATIONAL EXHIBITION AT EDINBURGH.—Premiums of £100 and £75. Conditions from J. Marchbank, 45 York Place, Edinburgh, Deposit, One guinea.

A Restaurant in Clifford's Inn.—Plans are now being prepared for the erection of a restaurant in Clifford's Inn, which was purchased by Mr. Willett four years ago for £100,000. The principal entrance to the restaurant will be in Clifford's Inn Square.

New Showrooms have been opened by Messrs. E. and C. Braby, the well-known builders' merchants, slaters, tilers, &c., at 7, Grape Street, Shaftesbury Avenue (Oxford Street end), London, W.C., a central address which, it is obvious, is very convenient of access for architects and clients. We had an opportuity last week of going through the commodious and well-arranged galleries, and all who are interested in high-class stoves and mantels should visit them also. Specimens of Jacobean, Tudor, Elizabethan and other Early English, Georgian, Adam and Early Victorian periods are very artistically set out in surroundings that enable them to be very easily judged. The feature of the galleries is this departure from conventional lines, the exhibits being arranged so as to give visitors an ample opportunity of inspecting the various suites, the whole being finished with ornaments and accessories in keeping with the different periods. On the first floor will be found a unique exhibit of quaint inglenooks and cosy corners suitable for halls, drawing and dining rooms, and some that have been specially designed for use in country cottages and bungalows. Separate showrooms are reserved for the "Art Nouveau" style, including specimens of the Glasgow School, and also for the more ordinary requirements of middle-class houses and offices. In the basement are specimen marble and tile-lined bathrooms fitted complete.

FOREIGN ARCHITECTURAL PUBLICATIONS.

A collection of foreign architectural publications can be seen this week at the Architectural Association's premises, 18 Tufton Street, Westminster, from 10 to 4 (admission free). They were originally brought together by Mr. Maurice B. Adams, in connection with his recent lecture at Newcastle on "Architectural Journalism." The following is a list of them, with the annual subscription rates :—

	Per annum. post free.
AMERICAN.	
"American Architect and Building News" (Boston). *Weekly International Edition*	£3 15 0
"American Building Association News" (Cincinnati). *Monthly*	0 7 0
"American Carpenter and Builder" (Chicago). *Monthly*	0 10 0
"American Homes and Gardens" (New York). *Monthly*	1 0 0
"Architects' and Builders' Magazine" (New York). *Monthly*	0 15 0
"Architect and Engineer of California" (San Francisco). *Monthly*	0 10 0
"Architectural Record" (New York). *Monthly*	0 18 0
"Architectural Review" (Boston). *Monthly*	1 10 0
"Architecture" (New York). *Monthly*	1 10 0
"Architecture and Building" (New York). *Weekly*	—
"Brickbuilder" (Boston). *Monthly*	1 10 0
"Bulletin of the American Institute of Architects" (Washington). *Quarterly*	—
"Carpentry and Building" (New York). *Monthly*	0 7 0
"Cement and Engineering News" (Chicago). *Monthly*	0 12 0
"Construction" (Allegheny, Pa.). *Weekly*	—
"Drainage Journal" (Indianapolis). *Monthly*	0 7 0
"House and Garden" (Philadelphia). *Monthly*	0 17 0
"House Beautiful" (Chicago). *Monthly*	0 12 0
"Inland Architect" (Chicago). *Monthly*	2 12 0
"Inland Architect and New Record" (Chicago). *Monthly*	1 6 0
Ditto (Photo Edition)	2 0 0
"International Studio" (New York). *Monthly*	1 10 0
"National Builder" (New York). *Monthly*	0 12 0
"Ohio Architect and Builder" (Cleveland). *Monthly*	0 6 0
"Southern Architect and Building News" (San Francisco). *Monthly*	—
"Western Architect and Builder" (Cincinnati). *Weekly*	1 0 0
Ditto. *Monthly*	0 12 0
"Woodcraft" (New York). *Monthly*	0 10 0
COLONIAL.	
"Architect, Engineer and Surveyor's Journal" (Cape Town)	—
"Art and Architecture" (Sydney). *Monthly*	—
"Canadian Architect and Builder" (Toronto). *Monthly*	1 0 0
"Progress" (with Architecture and Building Supplement) (Wellington, New Zealand). *Monthly*	0 8 0
DUTCH.	
"Afbuldingen van Oude	—
"De Architect" (Haarlem). *Six parts*	1 2 0
"Architectura" (Amsterdam). *Weekly*	1 1 0
"Bavkundig Tvdschrift." *Quarterly*	0 4 0
"Bestaande Gebouwen." *Annual*	0 4 0
"Bouwkundig Weekblad" (Amsterdam)	1 15 0
"De Bouwwereld" (Amsterdam). *Weekly*	1 2 0
"L'Emulation" (Brussels). *Monthly*	1 15 0
FRENCH.	
"L'Architecte" (Paris). *Monthly*	2 5 0
"L'Architecture" (Paris). *Weekly*	1 6 0
"L'Architecture et la Construction dans le Nord" (Lille). *Monthly*	1 10 0
"D'Architecture, Revue mensuelle de l'Art Architecturel" (Paris)	—
"Arts dans la Construction Parisienne" (Paris). *Monthly*	1 4 0
"Le Bâtiment" (Paris). *Bi-weekly*	2 2 0
"Bulletin de l'Association Provenciale des Architectes Français" (Rouen). *Monthly*	—
"Concours publics d'Architecture" (Paris). *Monthly*	1 10 0
"La Construction Moderne" (Paris). *Weekly*	1 10 0
"Le Cottage" (Paris). *Monthly*	0 10 0
"Décoration Ancienne et Moderne" (Paris). *Monthly*	1 6 0
"Documents d'Architecture Moderne" (Paris). *Monthly*	1 6 0
"Entreprise" (Paris). *Bi-weekly*	1 6 0
"Gazette des Beaux-Arts" (Paris). *Monthly*	3 8 0
"Génie Colonial" (Paris). *Monthly*	0 14 0
"L'Ami des Monuments et des Arts." *Bi-monthly*	1 1 0
"Matériaux et Documents d'Architecture" (Paris). *Monthly*	0 15 0
"Moniteur du Dessin, de l'Architecture et des Beaux-Arts" (Paris)	0 6 0
"Monographe des Bâtiments Modernes" (Paris). *Monthly*	0 15 0
"Nouvelles Annales de la Construction" (Paris)	0 17 0
"Petits Edifices Historiques" (Paris). *Monthly*	1 0 0
"Revue Générale de la Construction" (Paris)	0 12 0
GERMAN, AUSTRIAN AND SWISS.	
"Der Architekt" (Vienna). *Monthly*	1 6 0
"Architectonische Rundschau" (Stuttgart). *Monthly*	1 4 0
"Architektur der alten und neuen Zeit" (Berlin). *Monthly*	1 10 0
"Architektur des 20. Jahr. Zeitschrift für mod. Baukunst" (Berlin). *Quarterly*	2 2 0
"Architectur-Konkurrenzen." *Monthly*	0 18 0
"Architektur-Studien" (München). *Per part*	0 3 0
"Baumformen" (Moderne) (Stuttgart). *Monthly*	1 10 0
"Das Baugewerbe" (Berlin). *Weekly*	0 12 0
"Baugewerkszeitung" v. Fusch (Berlin). *2-weekly*	1 5 0
"Bauhütte (Deutsche)" (Hanover). *Weekly*	0 15 0
"Bauindustrie-Zeitung" (Vienna). *Weekly*	1 15 0
"Bauingenieur-Zeitung" (Berlin). *Fortnightly*	0 12 0
"Baumaterialenkunde" (Karlsruhe). *Fortnightly*	1 0 0
"Der Baumeister" (München). *Monthly*	1 10 0
"Der Bautechniker" (Vienna). *Weekly*	1 2 0
"Der Bauzeichner" (Lübeck). *Weekly*	1 0 0
"Bauzeitung" (Allgem.) von Forster (Vienna). *Quarterly*	1 2 0
"Deutsche Bauzeitung" von Hoffman und Eiselen (Berlin). *Twice weekly*	1 10 0
"Leipziger Bauzeitung" (Leipzig). *Wkly.*	0 12 0
"Schweizer Bauzeitung" von Waldner (Zürich) *Weekly*	1 8 0
"Bauzeitung für Würtemberg, Baden, Hessen, Elsass-Lothringen" (Stuttgart). *Weekly*	0 15 0
"Berliner Architekturwelt" (Berlin). *Monthly*	1 5 0
"Blätter für Architektur und Kunsthandwerk" von Graef (Berlin). *Monthly*	1 10 0
"Denkmalpflege" (Berlin). *16 numbers*	0 12 0
"Entwürfe." *Annual*	0 6 0
"Der Formenschatz" (München). *Monthly*	0 18 0
"Hohewarte" (Leipzig)	—
"Das Landhaus" (Wiesbaden). Illustrated. *Monthly*	0 15 0
"Das Deutsche Landhaus" (Charlottenburg). *Monthly*	1 5 0
"Neubauten." *Monthly*	0 15 0
"Der Städtebau" (Berlin). *Monthly*	1 4 0
"Wochenschrift des Architektenvereins zu Berlin" (Berlin). *Weekly*	0 15 0
"Wochenschrift (Oesterreich.) für den öffentlichen Baudienst" (Vienna). *Weekly*	1 5 0
"Zeitschrift für Architektur- und Ingenieurwesen" (Wiesbaden). *Six parts in a year*	1 5 0
"Zeitschrift des Oesterreichischen Ingenieur- und Architektenvereins" v. v. Popp (Vienna). *Weekly*	1 12 0
"Zeitschrift für Bauwesens" (Berlin)	—
"Zeitschrift für Christliche Kunst" (Düsseldorf). *Monthly*	0 15 0
"Zentralblatt für d. deutsche Baugewerk" (Berlin). *Weekly*	0 15 0
"Zentralblatt d. Bauverwaltung" (Berlin). *104 numbers*	1 4 0
HUNGARIAN.	
"A Maggar Mernok-es-Epitesz-Egylet" (Budapest)	—
"Heti Ertisiotöje" (Budapest)	—
ITALIAN.	
"L'Architectura" (Torino)	1 10 0
"Bollettino della Societa degli Ingegruri a delgi Architetti Italiani" (Rome). *Weekly*	—
"Memorie d'un Architetto." *Monthly*	0 8 0
JAPANESE.	
"Journal of Architecture of Japan" (Tokio)	—
RUSSIAN.	
"Journal de la Société Impériale des Architectes" (St. Petersburg)	2 10 0
"Zodtchy" (St. Petersburg)	2 10 0
SPANISH.	
"El Arte y la Ciencia" (Mexico)	—
"Gaceta de Obras Públicas" (Madrid). *Weekly*	—
SWEDISH.	
"Teknist Ugeblad" (Christiania)	—
"Teknisk Tidschrift"	—

ETHICS OF COLOUR ARCHITECTURE

The effort to create a building immune from the seriously destructive effects of a city atmosphere is not a new endeavour, but the initiation of an architecture to be expressed in terms of colour is a novel development in modern design. The two intentions are to some extent inseparably connected. To achieve the first purpose the use of glazed material is necessary, and the use of such material involves a reconsideration of form to suit the exigencies of colour. Mr. Halsey Ricardo states his ideas on this subject in connection with the house erected from his design in Addison Road, Kensington, which is admirably illustrated by sixteen photographic views and a coloured plate in "The Architectural Review" for March. Another distinguishing feature of this issue is the illustrated article on the new Central Criminal Court.

Notes and News

New headquarters of the Post Office Savings Bank in Vienna have just been completed from designs by Otto Wagner, senior Government architect.

City Architect for Worcester.—Mr. Alfred G. Parker has been appointed City Architect of Worcester, at a retaining fee of £20 per annum, with a commission of 5 per cent. on work executed for the Corporation.

New Branch Libraries at Cardiff have been erected—one at Cathays from designs by Messrs. Spier and Beavan, and the other at Canton from designs by Mr. Bruce Vaughan, F.R.I.B.A., of Cardiff. The cost of each has been £5,000.

The Patent Indented Steel Bar Co., Ltd., have received a cable from New Zealand notifying them that the Jury of Awards of the International Exhibition now being held at Christchurch have awarded them a gold medal for their exhibit, this award being the highest that could be obtained. This is the third gold medal that the indented steel bar has been awarded at international exhibitions.

Northern Architectural Association.—The annual meeting of this Association was held on Wednesday last. Mr. A. B. Plummer was elected president in succession to Mr. Cackett. The report of the council for the 48th session recorded the increased success of the Association, the roll now comprising 249, the largest membership of any of the Allied Societies. The financial statement showed a balance in hand of £27.

General Post Office Extension. — The tender of Messrs. Holloway Brothers has been accepted for the erection of two new buildings which will form a further addition to the existing establishment at St. Martin's-le-Grand. The whole of the site formerly occupied by Christ's Hospital is to be excavated to the average depth of 26ft., so as to give basement floors in addition to a large boiler house; above ground level there will be two buildings, one 201ft. by 60ft. by 85ft. high, for the use of the public, and the other, 312ft. by 185ft. by 63ft. high, for use as a sorting office. These three structures are to be built throughout of Hennebique reinforced concrete.

New Works near Southport.—At Crossens, near Southport, new motor works are being erected for the Vulcan Motor Manufacturing and Engineering Co. (1906), Ltd. The architects are Messrs. Prescott and Bold, of Wigan, and the general contractors are Messrs. William Townson & Sons, Ltd., of Bolton. The works are one storey high, 175ft. long by 170ft. wide, finished with a weaving-shed type of roof, and placed behind and on each side of an office block. In addition to machine and erecting shops, there are a large engine room, gas-producer plant house, a smithy (82ft. by 39ft.), a brass foundry (46ft. by 63ft.), a covered yard, lavatory accommodation, etc. The steel work of the building is being executed by Messrs. Edward Wood & Co., Ltd., of Manchester: glazing will be on Heywood's patent system, and "Uralite" will be fixed on the underside of spars. The walls will be of brick, with dressings of red terra-cotta from Mr. J. C. Edwards' works at Ruabon; floors will be of concrete.

SUNDERLAND CHILDREN'S HOSPITAL COMPETITION.

The committee of the Sunderland Infirmary recently invited competitive designs for a children's hospital proposed to be erected at The Barnes. About 60 sets of drawings were ultimately received. The committee had the assistance of the Royal Institute of British Architects in the appointing of an assessor, and Mr. W. Lister Newcombe, of Newcastle-on-Tyne, was selected by the council. He has now adjudicated upon the designs submitted and his award has been nominally accepted by the hospital committee. The competitors, as a whole, are satisfied with the result of the competition, though the local architects were strongly in favour of a competition limited to those in practice in Sunderland: their proposal, however, did not meet with the approval of the committee, who authorised an open competition.

Site and Conditions.

The site was practically square and the levels showed a considerable fall from west to east: this appeared to be the chief difficulty, as the aspect was all that could be desired, being due south and looking towards a main thoroughfare, Durham Road. A detailed schedule of rooms accompanied the conditions and the latter looked reasonable until the accommodation and cost were compared. The principal rooms required were three wards large enough to contain 20 beds each, with cubic space of 1,000ft. to be allowed for each bed—height of wards about 13ft. 6ins.; also three wards each for two beds, one capable of being isolated. Each of the large wards had to be provided with a duty-room or ward kitchen, room for patients' clothes, lavatories, sinks and w.c.'s, in conjunction with a bathroom and housemaids' closet, also balcony (with south aspect) to each ward, wide enough for a cot, and to be fitted with sun blinds on wire stays. The remainder of the accommodation asked for and detailed on the plans illustrated included operating theatre, dispensary, &c., outpatients and casuals, general administration (on three floors), with kitchen, &c.; and the outbuildings comprised laundry, mortuary, post-mortem room, boiler house and stores. The cost of all these buildings had to be under £16,000, and this sum had to include ventilation, lighting and heating, building of boundary walls, architect's and quantity surveyor's commissions, clerk of work's salary, cupboards, desks, shelves, fire-grates, ranges, baths and sanitary fittings, gas and electric light fittings. Irrespective of the inclusive items, the total sum is considerably under the proportionate cost of recent buildings of a similar character, especially having regard to the hilly nature of the site and the necessity of using special materials, fittings and construction of the best quality, as specified by the conditions of the competition.

Design placed First.

This position, with premium of £100, has been awarded to Messrs. Armstrong and Wright, FF.R.I.B.A., of 38, Grainger Street West, Newcastle-upon-Tyne, who have most successfully solved all the points contained in the competition conditions. We illustrate the design as a centre plate this week. The principle which governs the distribution of the various buildings on the site, and which has ruled the planning of this scheme, is the general compactness and administrative convenience, with ease and rapidity of communication throughout for present and future extensions. Equally noticeable is the position of the various wards, south frontage being given to as many as possible of the ward blocks, with sun-houses for wards not so happily situated. Another point of importance is the widest possible spacing of the ward blocks within the limits of a site somewhat restricted for the accommodation required.

The question of levels, and the utilising of the natural fall from west to east, is cleverly solved in this scheme. It will be noticeable from the block plan that the future extensions can be carried out with the least possible disturbance to the general working of the hospital, the patients' block and the grounds facing Durham Road, which can be permanently laid out, thus giving to the institution a finished appearance. Much consideration has been given to the concentration of the departments, with due regard to their several uses and economical working. The quarters for the nurses are a feature of this scheme. Their rooms have been placed as far from their work as possible, are self-contained and retired; and the position of the matron on the ground floor allows of perfect supervision of the staircases; this applies also to the servants' quarters, which are placed over the central block of the administrative department. The chapel and operating theatre open off the connecting corridor and are conveniently placed, being readily approached from the administrative and outpatients' departments and wards by lifts at each end of the corridor. The position of the outpatients' department in close proximity to the main entrance gates in Durham Road is to be commended, as all the patients applying for admission to the hospital must pass through this department. The side corridors at the rear of the administrative department, and adjoining the kitchen, scullery, &c., are top-lighted, and, judging by the size of the roof lights shown on the first-floor plan, could be considerably enlarged without interfering with the arrangement of rooms or roof, as corridors over 70ft. in length, particularly in the kitchen wing, ought to be flooded with light and well-ventilated. The sun-houses with iron railing and connecting corridors are well tied into the main building, and in design form part of same without appearing like a range of conservatories, which the average hospital architect cannot depart from.

Design placed Second.

The second premium of £50 has been awarded to Messrs. Houston and Houston, of London. In arrangement and general disposition on the site of the various departments this scheme bears a similarity to the design placed first. The conformation of the site has, naturally, to a great extent determined the general lines of this plan. The pavilion system has of course been adopted upon a north and south axis. The buildings have been placed almost centrally upon the ground. The wards permit of a free air passage where they join the main corridor, though present wards are situated farther from the administration than many of the designs, and might not be so convenient for working and for service. An objection may be raised to the positions of the laundry block between two future wards, and rather close to the main corridor to be well disconnected. In the administrative portion the main hall appears very large, being carried up to the second floor. This was suggested by the conditions and appears extravagant, especially when economy had to be considered. The objection does not apply to the outpatients' department, where ventilation and light have been overlooked in endeavouring to gain compactness in the plan. In this department is a bathroom entirely surrounded by rooms and top lighted. The doors also of the conveniences for the sexes are too close together: they should be further disconnected, as parents would also use the lavatories, &c., occasionally. The building cubes about 560,000ft. and, priced at 6d., amounts to £14,000, leaving £2,000 for boundary walls and special items mentioned in the conditions.

Design placed Third.

The third premium of £25 has been awarded to Messrs. Henman and Cooper, of Birmingham. This scheme appears rather cramped, being concentrated in one corner, through too seriously considering the existing private road which the replies to queries stated could be done away with. No further extension is shown in the block plan, and, if continued from the main corridor would necessitate a large working staff, owing to the distance from the administrative department. The arrangement of the laundry, mortuary, etc., follows closely on the suggestions of the conditions. Advantage has been taken of the fall from west to east by providing on a lower ground floor the outpatients' dispensary, kitchen and stores departments, though they do not assist the appearance of the building, and the cost of banking up and excavating would prove expensive. The hall follows out the same type as the second-premiated design, being very large and carried up four floors, which are principally devoted to bedrooms for the nurses and servants. The block plan looks compact, but the administrative building is carried up to such a height that it would affect the lighting of the adjoining wards. The means of escape in case of fire or emergency have not been so carefully considered, particularly on the first floor. A single fire-escape stair is shown off the sun balcony in the west ward; the main stairs being situated in the administrative portion, over 130ft. along the main corridor from the ward doors. All outward display has been avoided in the elevations, the building being treated in almost a purely utilitarian manner. Flat roofs are extensively used; but the iron railings surrounding same are far too high and could have been designed in a more simple manner so as not to mar all the elevations. The cost of this building is given as practically the same as the second-premiated design, although the cube contents taken from the report show a slight increase of 10,000ft. over the former design. This can hardly be taken as a fair comparison, as the cost of flat roofs—which are much in evidence in this scheme—must be greater than a pitched roof of simple construction, and the extra cost of making-up the ground has not been reckoned, for the difference in levels between the main entrance and the outpatients' department has necessitated an artificial bank, which at its greatest height shows about 8ft. of made-up ground, and this covers a fair area.

Enquiries Answered.

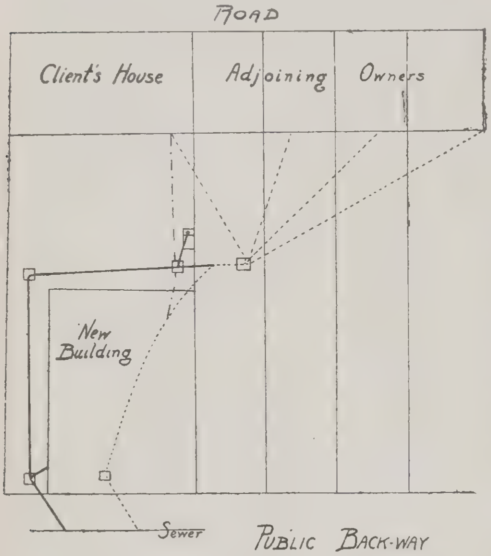
Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The querist's name and address must always be given, not necessarily for publication.

Correspondents are particularly requested to be as brief as possible.

Combined Drains.

X. writes: "Plans were prepared for a store to be built over a drain as shown by dotted lines on accompanying plan. This drain we intended to cover with concrete. The local council would not allow us to do so, but required the drain to be brought round the proposed building, as shown by solid lines on the plan. We began excavating for the new drain and found that the drain went through to the next property to an inspecting chamber, and that the drain from one client's house, instead of coming as shown by dot-and-stroke on plan, went through to the adjoining property to the inspecting chamber, where the drains of several houses also joined the drain. The surveyor to the council then instructed us to connect our drain as shown by solid lines, which we have done. Could our client claim from the adjoining owners, or the council, the costs of this drain? Also, could he cut the other drain off and lay a new drain from his house, as indicated by the dot-and-stroke line, without the adjoining owners claiming redress if he gave notice to do so?"



It would be impossible to give a definite opinion without a knowledge of how the drainage was carried out originally for these houses. On the face of it it looks as if the old drain, from the inspection pit on the adjoining owner's ground to your client's boundary, was a public sewer, and the authority could therefore prevent you from building over it, and could force you to divert it. These combined drains always cause trouble eventually. One man builds a row of houses, makes (with the sanction of the authority) a combined drain to save expense, and then proceeds to sell off the houses to different people, without disclosing anything about the drainage. If this is your case, there does not appear much prospect of recovery from the adjoining owners. The drain was satisfactory, so far as they were concerned; and the alteration was only necessitated by the decision of your client to build, and by his being forced to carry out that alteration according to the local council's instructions. But how did the adjoining owners first obtain the right of easement over your client's land for their drainage?

Architectural Draughtsmen, H.M. Office of Works.

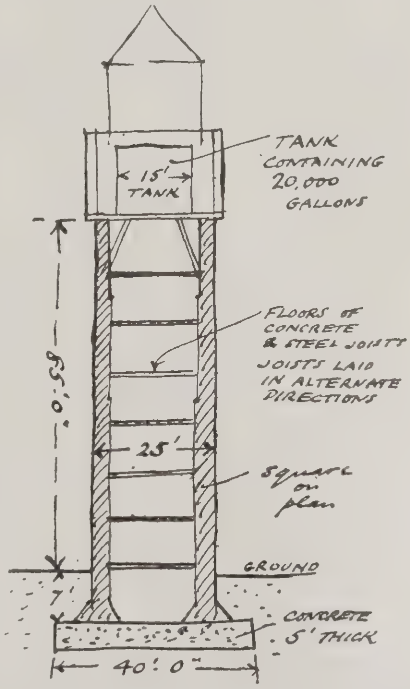
PENARTH.—J. B. H. writes 'Where can I get information as to appointments open to architectural draughtsmen under H. M. Office of Works?"

Appointments in the Office of Works are secured through examination, particulars of which can be obtained from the Secretary of the Civil Service Commission Burlington House, W. For any position it is first necessary to get on the temporary staff, from which staff appointments to the permanent staff are made as vacancies occur.

A Water Tower.

NORWICH.—J. B. writes: "Please give a satisfactory and reliable method of calculating the thickness necessary for the walls of a water tower of the dimensions shown by the accompanying sketch. The walls are to be of hard brickwork in cement, with a facing of softer bricks rising one more course to the foot than the hard bricks."

The water tower can be calculated as follows:—First find approximately the total dead load (W) on top of footings, then the bending moment due to the wind (M), then with an assumed sectional area of brickwork (A) at top of footings, and a consequent sectional modulus (Z), the maximum stress, compression one side and tension (if any) the other side, will be given by the formula $\frac{W}{A} \pm \frac{M}{Z}$. The maximum compression should not exceed 6 tons per sq. ft. and the maximum tension $2\frac{1}{2}$ tons per sq. ft. It is very undesirable to use bricks of different sizes and qualities in structures of this kind. Good hard stocks throughout are best in the long run. In the present case the smaller and softer facing bricks may be considered as adding weight but not strength.


15'
TANK
TANK CONTAINING 20,000 GALLONS
85'0"
FLOORS OF CONCRETE & STEEL JOISTS
JOISTS LAID IN ALTERNATE DIRECTIONS
25'
Square on plan
GROUND
7'
CONCRETE 5' THICK
40' 0"

HENRY ADAMS.

Trade and Craft.

Asbestos Slates.

We desire to draw the attention of readers to the "Eternit" asbestos slates which have been introduced into this country by Messrs. G. R. Speaker & Co., of 29, Mincing Lane, E.C. These are of the same thickness as British first-quality roofing slates, with a perfectly smooth surface, and are made of asbestos and hydraulic cement under a pressure of 1,500 tons. Their special features are that in addition to being fire-resisting they are heat-resisting, non-conducting and very durable: another important point is that they are laid diagonally, with the result that seven slates about 16ins. square cover one square yard, giving each slate a lap of $2\frac{3}{4}$ins., as compared with nearly 14 Welsh slates of the same size: a saving in weight of about 46lbs. per sq. yd. is thus effected. The smoothness of the surface and the accuracy with which the edges are cut prevent damp, wind, rain and snow entering between the laps, while exhaustive tests and experience in Great Britain and the Colonies during the past six or eight years demonstrate that these asbestos slates do not crumble nor scale, do not lose colour, and are not affected by changes of temperature. The colours in which "Eternit" slates are obtainable are terra-cotta, blue and granite grey. It is important to note that asbestos slates conduct fully 70 per cent. less sun heat than natural slates and clay tiles, and we are informed that while the initial cost of "Eternit" asbestos roofs is lower than that of any other durable roofing, there is also a saving in the upkeep. The cost of these slates ($15\frac{3}{4}$ins. by $15\frac{3}{4}$ins. by $\frac{1}{8}$in.) is £17 per 1000. They have been used for important buildings throughou the country, both by private owners, corporations and Government departments, and have met with general approval.

Some American Lead Pencils.

We welcome the addition of any good lead pencil. Of course, many varieties are on the market, but, unfortunately, most of them are badly made of gritty or fragile lead. There are also many deceitful pencils which appear to be made of good lead throughout when sharpened from the proper end, but are found, when half-way through, to be made up of short pieces which break off in the sharpening, so that one finds the pencil does not wear well all through. We are glad to see, therefore, the new "Venus" pencils which the American Lead Pencil Co., of 21, Farringdon Avenue, London, are introducing. So far as we can tell from the samples sent, these pencils are of excellent quality and remarkably good value for the money, the pencils being low in price. A good many qualities are made, varying from very hard to very soft, yet throughout the lead seems to be free from grit, and the colour fast.

A new Chapel at Taunton School has been built of local red sandstone from designs by Mr. Frank W. Wills, F.R.I.B.A., of Bristol. Messrs. W. Cowlin & Sons, of Bristol, were the builders. Marble and mosaic work has been executed by Messrs. Art Pavements and Decorations, Ltd., of London; the lectern (in brass) has been supplied by Messrs. Singer & Sons, of Frome; and the hot-water system has been installed by Messrs. J. Crispin & Sons, of Bristol.

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Armathwaite (Cumberland).—For the erection of a stone bridge of four arches across the River Eden, for the Highways and Bridges Committee of the Cumberland C.C. Mr. George J. Bell, M.I.C.E., county surveyor and bridgemaster, The Courts, Carlisle :—

Whitaker Bros., Horsforth Leeds	£7,212	0	0
R. Little, Carlisle	6,508	18	8
G. Dougill & Sons, Aysgarth, Yorks	5,219	7	6
J. Mackay, Sewage Works, Carlisle	5,158	2	10
T. Telfer,* Langholme, N.B.	4,964	16	9
F. Millward & Co., Carlisle	4,928	0	0
G. McIldowie, The Lees, Annan	4,908	11	0
T. Lant, Builth Wells, Wales	4,878	6	3

* Accepted.

County surveyor's estimate, £5,000.

Chatham.—For the erection of a laundry building and boilerhouse on land adjoining the workhouse, for the Guardians of the Medway Union. Mr. E. Farley Cobb, architect, 20, High Street, Rochester :—

Emerson, Oakham	£3,461
Langley, Gillingham	3,205
Tuffee, Gravesend	2,860
Chesswas, Isleworth	2,757
Browning, Strood	2,650
Johnson & Son, Leicester	2,633
Loasby & Salmon, Hither Green	2,624
West Bros., Rochester	2,590
Blay, Dartford	2,570
Baker, Strood	2,555
Barden & Head, Maidstone	2,544
Snow, Gillingham	2,500
Gates, Frindsbury	2,480
Webb, Rochester	2,475
Lonsdale, Swanley	2,418
Miskin, Gravesend	2,367
Cornelius & Son, Gillingham	2,350
Monk, Sittingbourne	2,335
Phillips, Gillingham	2,310
Filley, Chatham	2,206
C. E. Skinner,* Chatham	2,193

* Accepted.

Architect's estimate, £2,530.

Hanwell.—For the erection of a new cookery and manual training centre at St. Ann's Council Schools, for the Middlesex C.C. Mr. H. G. Crothall, architect :—

T. Platford & Son	£1,544
A. & B. Hanson	1,542
Tribe & Co.	1,519
Mattock & Parsons	1,487
G. Bollom	1,486
J. Dorey & Co.	1,449
W. J. Dickens	1,440
J. Barker & Co.	1,383
W. Lacey,* Hounslow	1,346

* Accepted.

Hayes.—For the erection of a new Council school at Clayton Road, for the Middlesex C.C. Mr. H. G. Crothall, architect :—

H. Lovatt, Limited	£3,900
F. G. Minter	3,868
C. F. Kearley	3,855
H. Knight & Son	3,759
W. Johnson & Co.	3,680
Fassnidge & Son	3,651
W. J. Renshaw	3,642
A. & B. Hanson	3,590
W. Portsmouth	3,577
Fairhead & Son	3,555
W. Lawrence & Son,* Tottenham	3,544

* Accepted.

Hereford.—Accepted for alterations in forming new shop front to Messrs. Gardiner's premises, High Town. Mr. H. Skyrme, architect, 138, Widemarsh Street, Hereford :—

E. Cooke, Hereford	£81

Hereford.—Accepted for conservatory and other works to Alberta Villa, Highfield Estate, Tupsley. Mr. H. Skyrme, architect, 138, Widemarsh Street, Hereford :—

Thomas Hiles, Hereford	£75

London, W.—For the erection of additions to the Acton and Chiswick Polytechnic, for the Middlesex C.C. Mr. H G. Crothall, architect :—

Gough & Co.	£8,292	0	0
W. Gibson & Co.	7,994	0	0
H. Lovatt, Limited	7,950	0	0
Spencer, Santo and Co.	7,797	0	0
G. Bollom	7,655	0	0
W Lacey	7,525	0	0
F. G. Minter	7,509	0	0
H. Knight & Son	7,464	0	0
W. J. Dickens	7,400	0	0
W. J. Renshaw	7,377	0	0
D. D. Heath	7,350	0	0
J. Barker & Co.	7,287	0	0
J. Dorey & Co.	7,099	0	0
W. Lawrence & Son	7,074	0	0
W. Johnson & Co.	7,047	0	0
Wisdom Bros.,* Isleworth	6,899	10	0

* Accepted.

London, S.W.—For the erection of a school for 390 infants, on the Rosendale Road site, Wandsworth, for the L.C.C. :—

Lathey Brothers, Battersea Park	£7,112
J. Garrett & Son, 83, Balham Hill	7,042
W. Downs, Walworth Road	6,947
H. L. Holloway, Deptford	£6,918
J. Smith & Sons, Ltd., South Norwood	6,881
J. Marsland & Sons, Walworth	6,870
J. Appleby & Sons, Stamford Street	6,860
Holliday & Greenwood, Ltd., Brixton	6,774
W. Smith & Son, Harleyford Road	6,672
E. Triggs, Clapham	6,596
W. Johnson & Co., Ltd., Wandsworth Common	6,550
T. D. Leng, Deptford	6,514
Rice & Son, 15, Stockwell Road	6,441
J. & C. Bowyer, Upper Norwood	6,386
L. Whitehead & Co., Ltd.,* Portland Works, Portland Place North, Clapham Road	6,327

* Recommended for acceptance.

Architect's estimate, £6,503.

London.—For roadwork and paving works in connection with the reconstruction of tramways from Vauxhall to Brixton and construction of new lines from Goose Green to Peckham, and along Tooting High Street and Mitcham Road, for the L.C.C. :—

J. G. White & Co., London	£100,977
W. Griffiths and Co., London	92,091
J. Mowlem & Co., London	87,714
R. W. Blackwell & Co , London	84,007
Dick, Kerr & Co., London	83,052
W. Manders,* Leyton	82,722

* Recommended for acceptance (with power to sublet certain portions).

London, S.E.—For the re-erection of shop and premises at No. 73, George Row, Bermondsey, for Mrs. Lillico. Messrs. Dunsmore Brothers, architects, 1, Garthorne Road, Honor Oak Park, S.E. :—

J. Buller	£476
W. Nash	398
G. Potton & Son	394
A. White & Co.	359
A. Harrison	310
Gathercole Brothers	300

Ossett (Yorks).—For the erection of Southdale Council School, for the Ossett Education Authority :—

Excavator, bricklayer, and mason—

W. H. Dews & Co., Leeds	£5,599	0	0
Humphreys & Green, Dewsbury	4,486	11	0
Flower Bros., Wakefield	4,500	0	0
W. R. Booth, Clayton	4,420	0	0
J. Ellis & Sons	4,293	17	6
Mercer & Robinson	4,189	10	0
M. Senior	4,067	0	0
F. W. Denholme & Co., Wakefield	4,014	0	0
T. Oldroyd & Sons	3,995	0	0
A. Lockwood & Sons	3,940	0	0
Peace and Oldroyd,* Ossett	3,812	19	0

Carpenter and joiner—

M and T. Ellis	£2,395	0	0
W. H. and J. W. Clegg, Dewsbury	2,239	7	7
F. W. Brook	2,196	0	0
F. W. Denholme & Co.	2,180	7	3
J. H. Horsnell	2,098	0	0
W. & E. Whitehead	2,085	0	0
J. W. Harrop, Ossett	2,062	0	0
S. Foster and Co., Keighley	2,017	16	0
W. H. Pick, Bradford	1,998	8	3
Land & Nettleton	1,982	0	0
S. Armitage & Sons, Dewsbury	1,974	0	0
M. Lockwood & Sons,*	1,872	10	0

* Accepted.

Shirley (Hants).—For the erection of stabling accommodation at Clock House, for the Corporation of Southampton. Mr. J. A. Crowther, borough borough engineer :—

E. Preece	£3,061
Bagshaw & Sons	2,960
L. J. Richards	3,000
H. Stevens & Co.	2,586
J. Nichol	2,514
H. C. Dyett	2,437
W. Jupe	2,421
H. Lawrence	2,395
F. Osman	2,380
Jenkins & Sons	2,367
G. R Long,* Southampton	2,342

* Accepted.

Southall.—For the erection of new Council schools in Clifton Road, for the Middlesex C.C. Mr. H. G. Crothall, architect :—

F. G. Minter	£6,067
Treasure & Son	5,867
G. Bollom	5,775
Knight & Son	5,701
J. Barker & Co.	5,682
W. J. Dickens	5,631
J. Dorey & Co.	5,590
W. Lawrence & Son	5,474
Mattock & Parsons	5,430
Wisdom Bros.	5,365
W. J. Renshaw	5,365
A. & B. Hanson,* Southall	5,339

* Accepted.

Staines.—For pipelaying at Staines reservoirs communication works, Child's Hill to Cranley Gardens, for the Metropolitan Water Board :—

Mayoh & Haley, London	£49,385	0	0
T. Docwra & Son, London	42,267	18	3
J. Mowlem & Co., Westminster	42,115	0	0
Scott & Middleton, Westminster	40,123	0	0
Baldry & Yerburgh, London	37,739	6	1
J. Aird & Sons, Lambeth	36,721	7	2
A. E. Nunn, London	34,575	14	8
G. Hay & Co., London	34,000	0	0
W. Muirhead & Co., London	32,464	9	6
R. McAlpine & Sons, London	31,599	0	9
J. Byrom, Ltd., Bury	29,975	15	0
J. Moran & Sons	28,990	0	0
Davies, Ball, & Co ,* Westminster	27,425	0	0

* Recommended for acceptance.

(*Concluded on page xxxi.*)

ARCHITECTURAL DIS-ORDERS COMPETITION.

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The competition is divided into two parts—the first appealing mostly to students and practitioners of architecture and the second more especially to those practically engaged in constructional work. The most valuable prize will be given for the highest number of correct solutions of all the pictures in both divisions, but the rest of the prizes will be allocated to two classes, so that every reader will stand a chance of winning a prize.

As regards division A (architecture) we would call attention to the fact that a number of the questions will directly relate to the Orders of architecture, these being wrongly drawn in some way or other: and in solving these questions it will be found very useful to refer to the series of articles published recently in our columns under the title of "Practical Notes for Architectural Draughtsmen," by Messrs. Alfred W. S. Cross and Alan E. Munby, which series is being separately published as plates for use on the drawing-board.

The pictures in the "Architectural Dis-Orders Competition" will be published each week for 26 weeks in THE BUILDERS' JOURNAL. The first, second, third, fourth and fifth sets have been given in the issues for February 6th, 13th, 20th and 27th, and March 6th, respectively, and the sixth set in this issue.

Competitors may send in as many sets of solutions as they please, provided they are in accordance with the conditions.

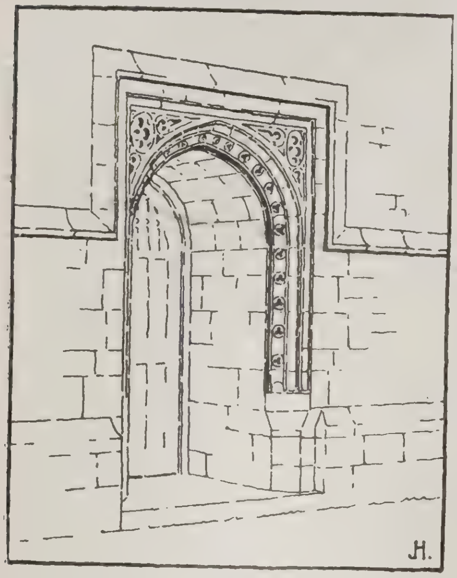
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

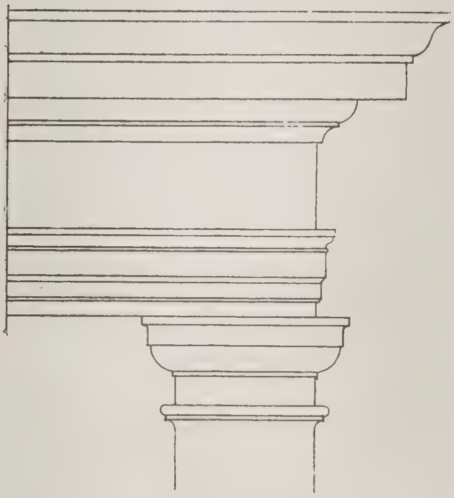
ARCHITECTURAL DIS-ORDERS COMPETITION.

(Sixth Series.)

CLASS A (ARCHITECTURE).



A 16



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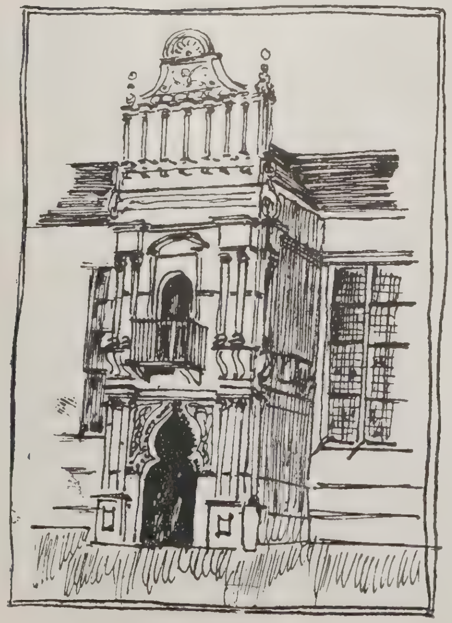

A 18

THE PRIZES.

£20, and 50 other valuable prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions to the question "What is wrong?" in relation to each of the drawings published in the "Architectural Dis-Orders Competition." The winner, or winners, of this special prize will not be eligible for any of the other prizes offered.

The remainder of the prizes are divided into two classes, as follows:—

Class A (Architecture).

1st Prize.—£10.

2nd Prize.—Morocco leather pocket case of German silver instruments, comprising 5-in. sector-jointed compass, with double knee-joints, hair spring attached to the divider leg of compass, nut and bolt needle points, pen and pencil legs, lengthening bar, set of three spring bows, ruling pen.

3rd Prize.—Leather case of instruments, containing 4-in. German silver bow compass, hinged pen and pencil points, needle or lead holder, and handle to take pen or pencil leg.

4th Prize.—Leather case of beam compasses, with tangent screw adustment, and needle points (electrum).

5th Prize.—Architect's pine drawing board, grooved, with mahogany battens, brass slots and screws to allow of contraction. One edge inlaid with ebony. Size 28ins. by 21ins.

6th Prize.—A morocco pocket case containing an English set of three spring bows, with steel heads and steel points (divider, pen and pencil).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case containing 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, pencil and 6-in. diagonal scale.

9th Prize.—A brass proportional compass, 6-in., partly divided.

10th Prize.—A pocket divider, electrum.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

Class B (Building).

1st Prize.—£10.

2nd Prize.—Abney level in morocco case, with 5-in. rack and vernier.

3rd Prize.—Best English-made electrum *Napier* pocket compass.

4th Prize.—A drawing set, comprising drawing-board (size 23ins. by 16ins.), 24-in. T-square, 2 large set-squares, and set of instruments in rosewood case, comprising 4-in. brass divider, needle-pointed compass with pen and pencil points, bar, patent pencil point, slip rule, &c.

5th Prize.—A pair of builder's rods, spring-jointed.

6th Prize.—A pair of builder's rods (not jointed).

7th Prize.—A patent metallic wind-up measuring tape, in leather case, with folding handle, 33ft.

8th Prize.—A pocket case, contining 5-in. brass barrel compass, 4½-in. round-pointed divider, 2 wood set-squares, celluloid protractor, and 6-in. diagonal scale.

9th Prize.—Spirit level, 15ins., brass-faced.

10th Prize.—2-ft. fold-up boxwood rule, brass-jointed, fully divided, 4 bevels.

11th to 25th Prizes.—Philotechnic set, consisting of two double-bevelled boxwood rules in case.

(For Coupons see page vi.)

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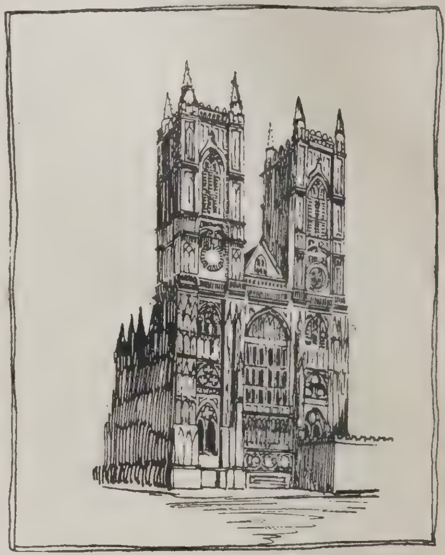
*Copies of "*THE BUILDERS' JOURNAL*" in which the first, second, third, fourth and fifth series of pictures appeared can now be obtained from the Publisher. The dates of the issues are February 6th, February 13th, February 20th, February 27th and March 6th respectively.*

CLASS B (BUILDING).



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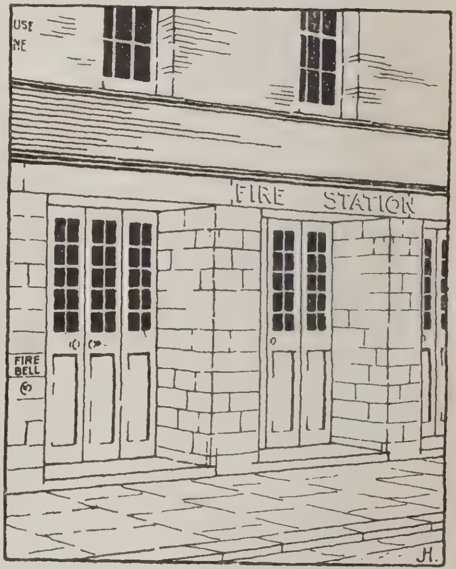

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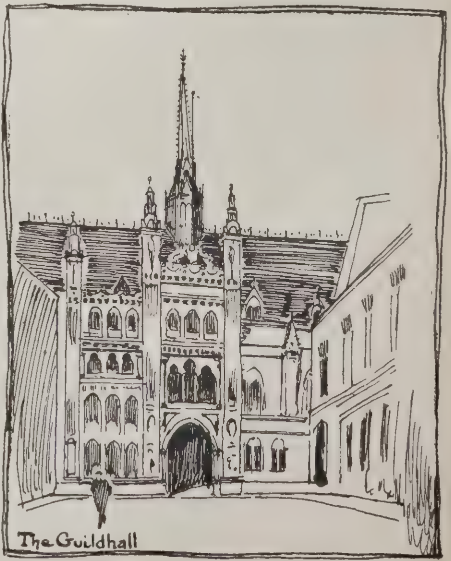

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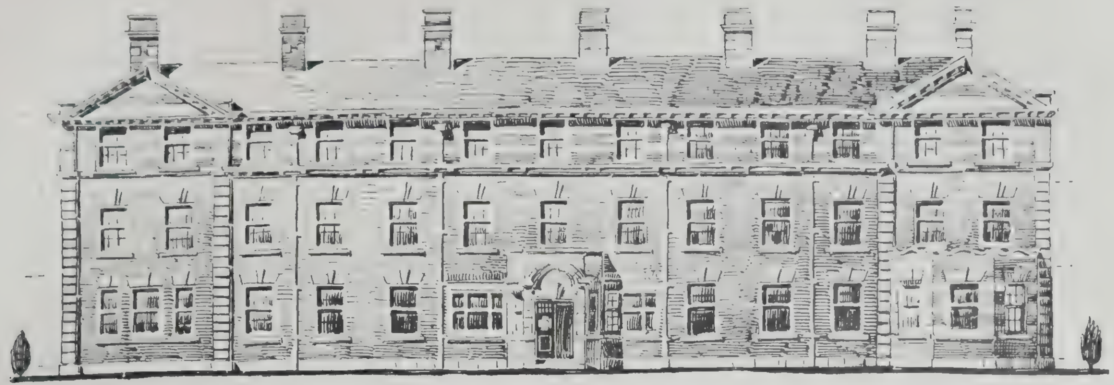
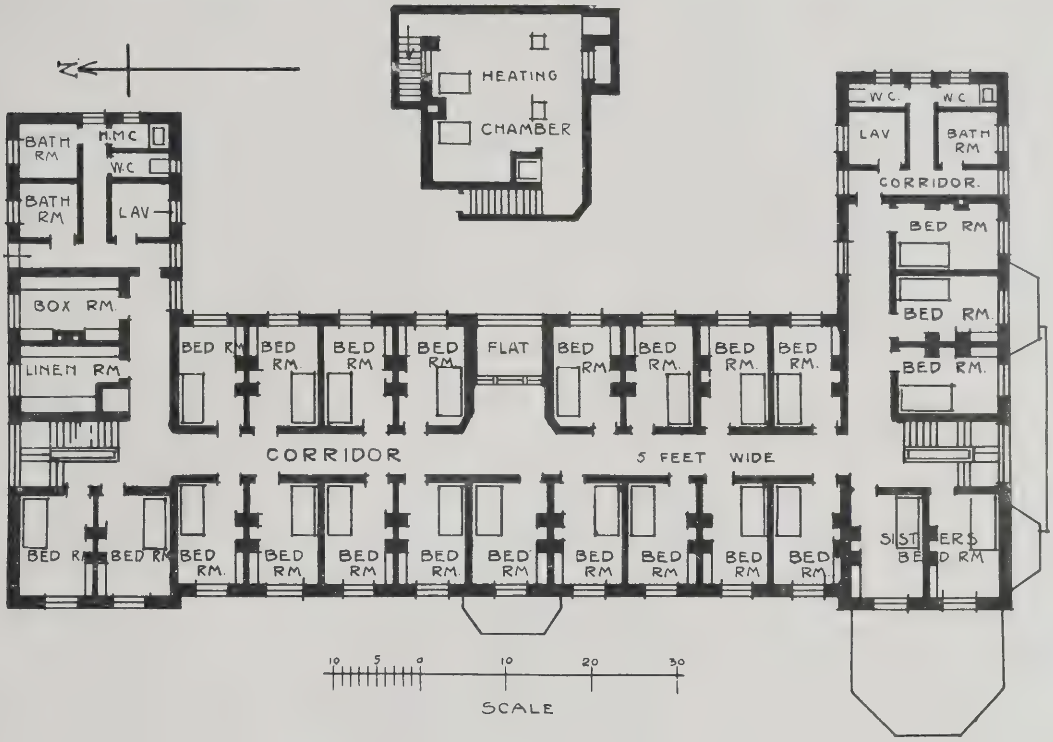
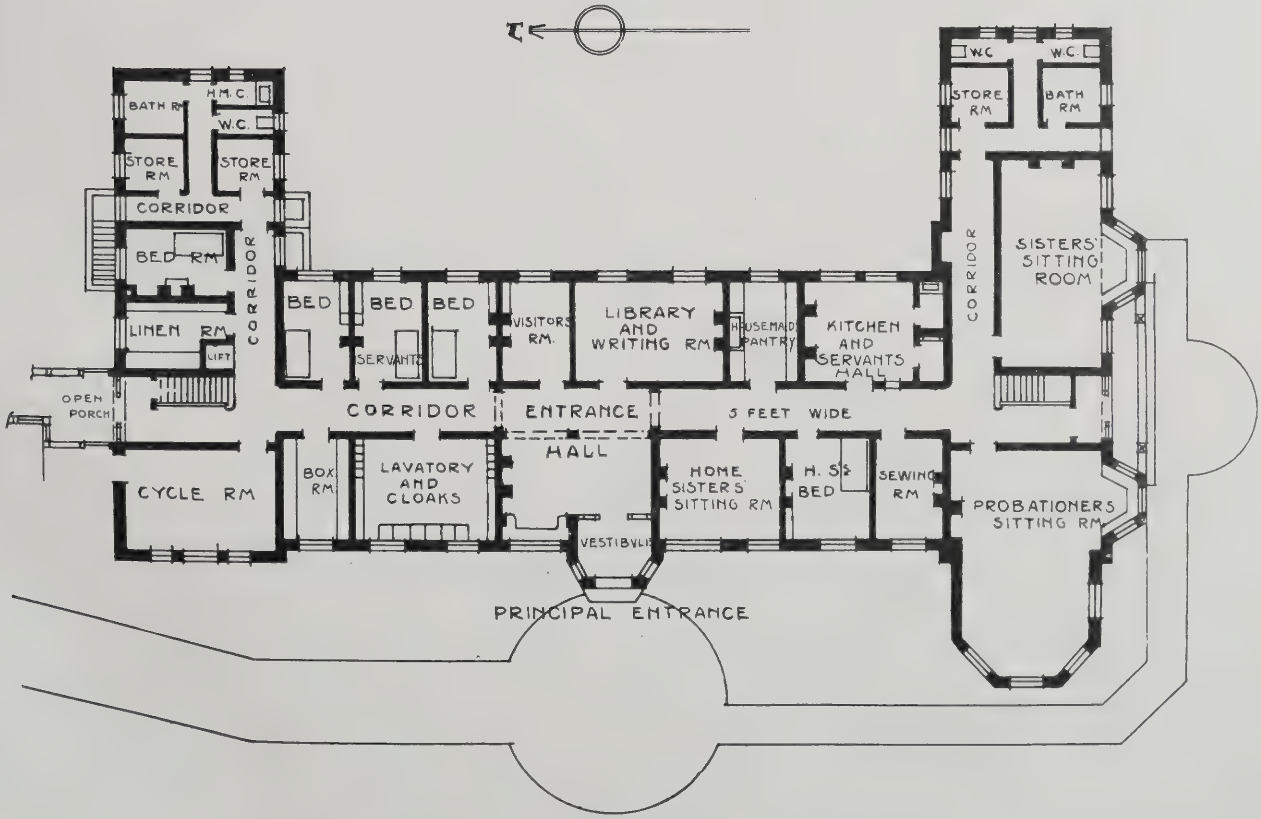
The Builders' Journal and Architectural Engineer,
Wednesday, March 20th, 1907.



Front Elevation to Vicarage Road.



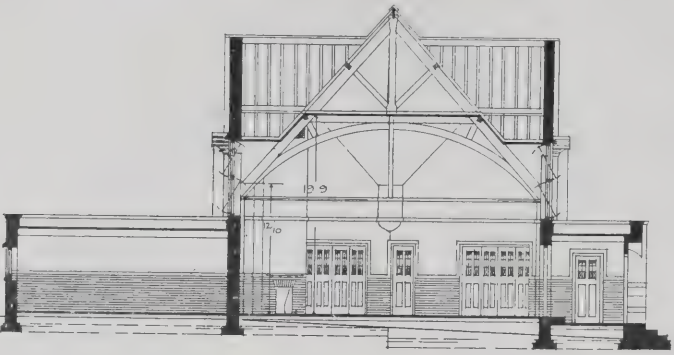
First- and Second-Floor Plan.



Ground-Floor Plan.

NURSES' HOME, WOLVERHAMPTON GENERAL HOSPITAL. ARTHUR W. WORRALL, ARCHITECT.

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER;
Wednesday, March 20th, 1907.



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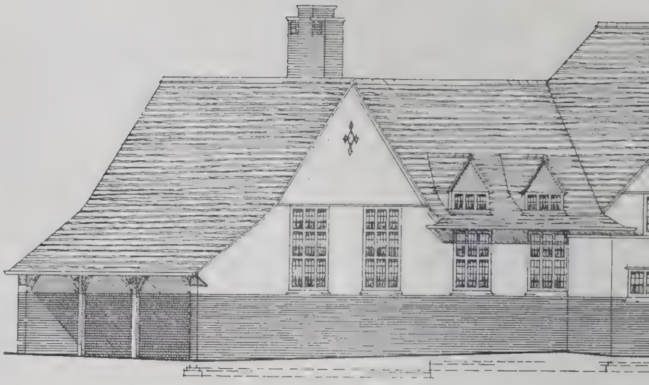

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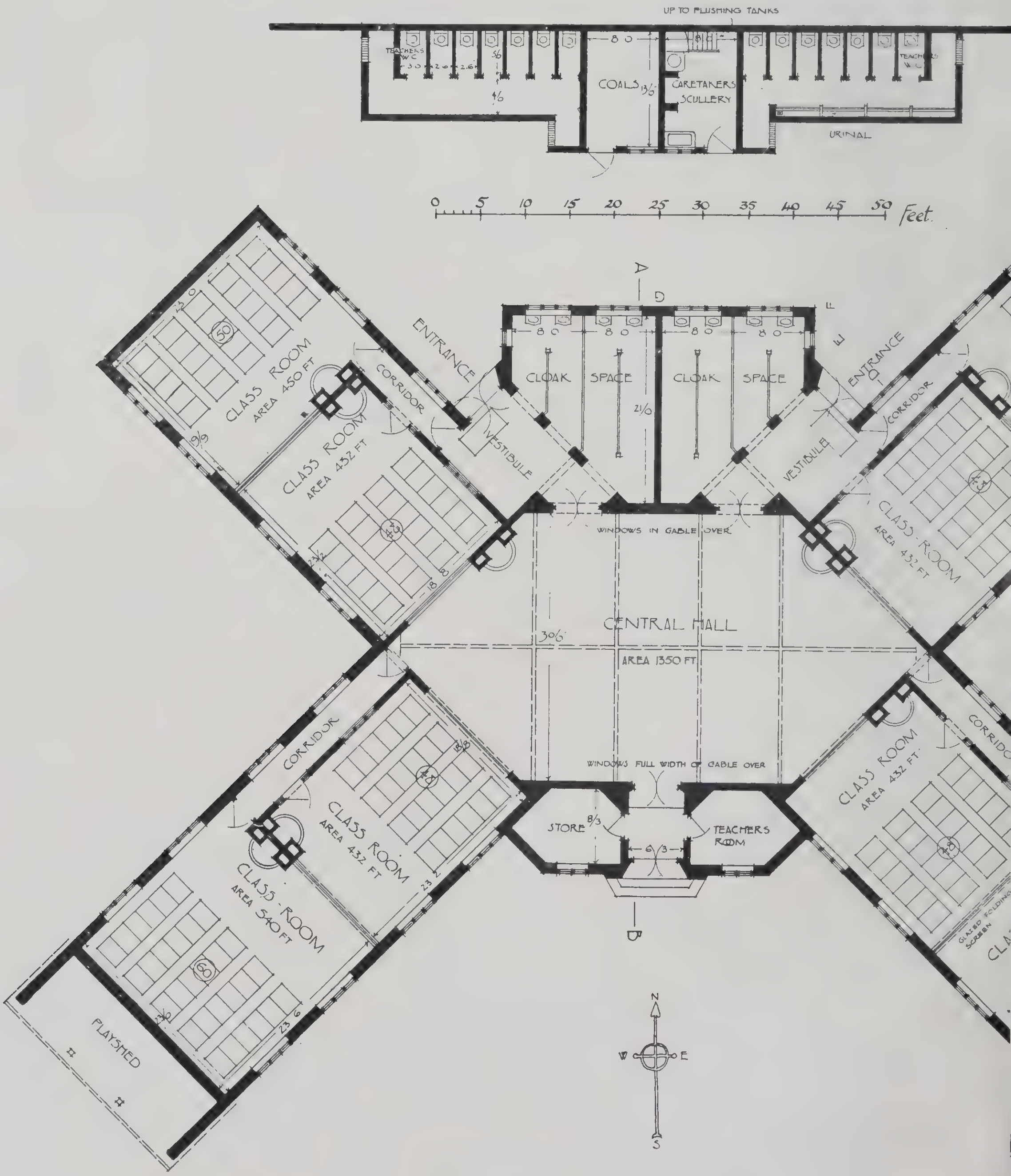
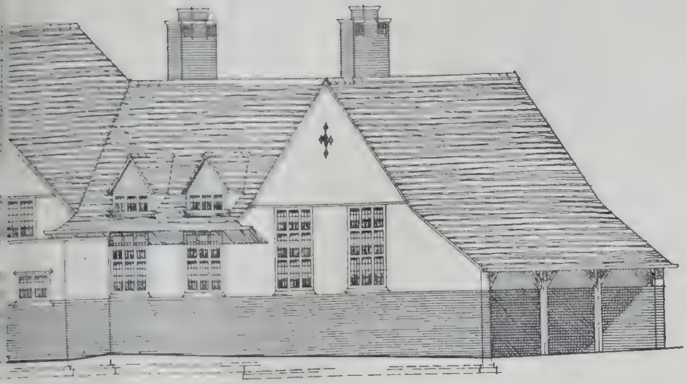
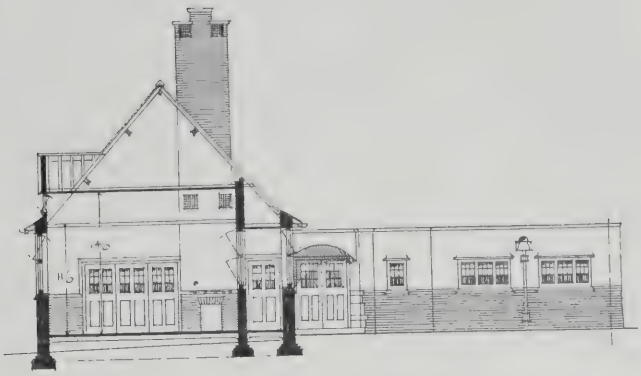


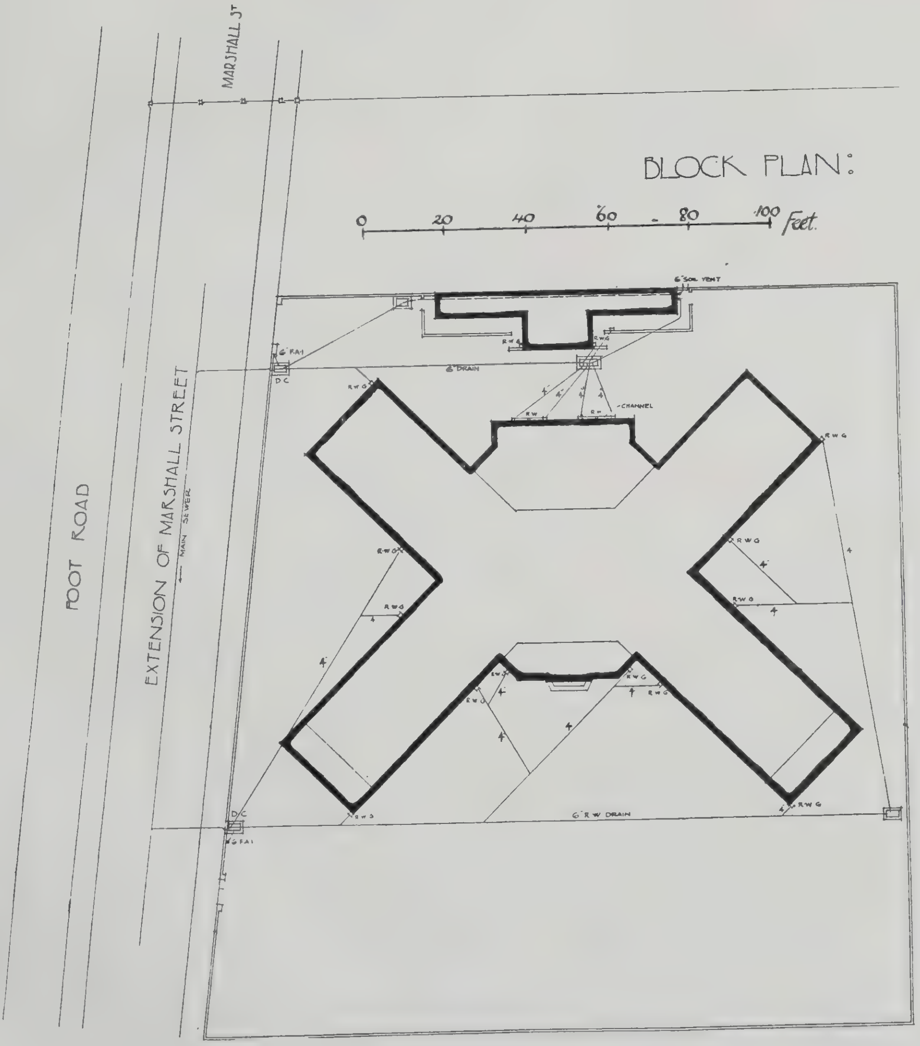




SECTION ·C·D· & EXTENDED ELEVATION ·E·F·G·

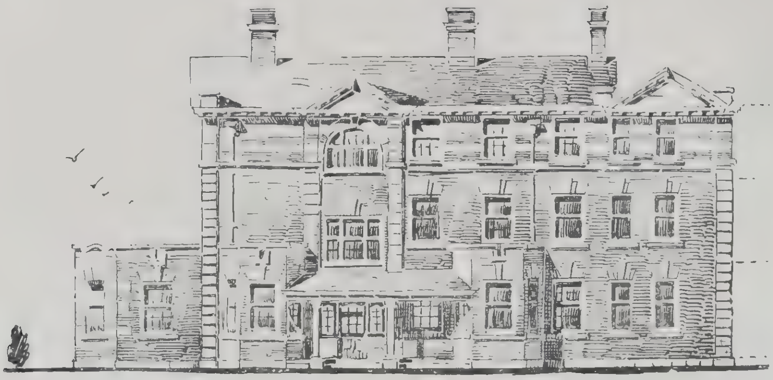
PROPOSED SCHOOL AT ALFRETON FOR 412 INFANTS
FOR THE DERBYSHIRE COUNTY COUNCIL.

PERCY · B HOUFTON · ARCHITECT
CHESTERFIELD

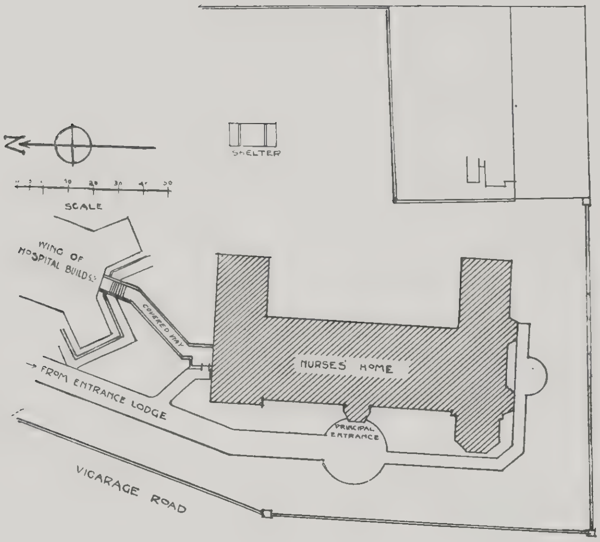


BLOCK PLAN:

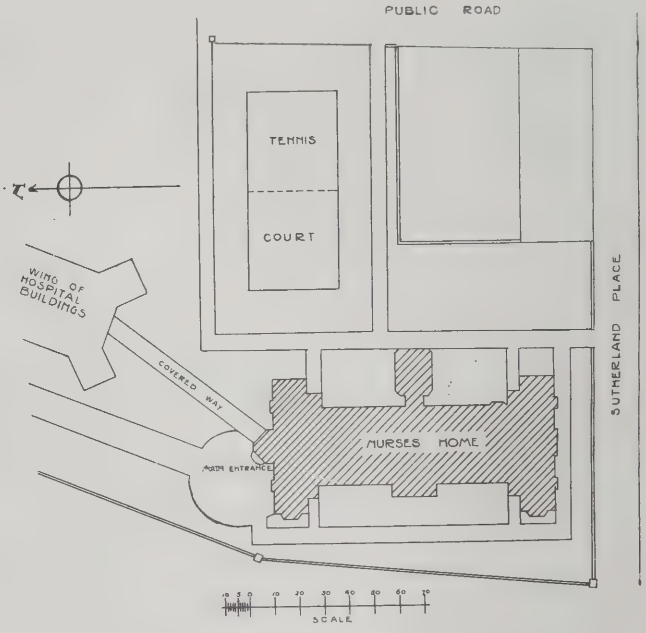
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, March 20th, 1907.



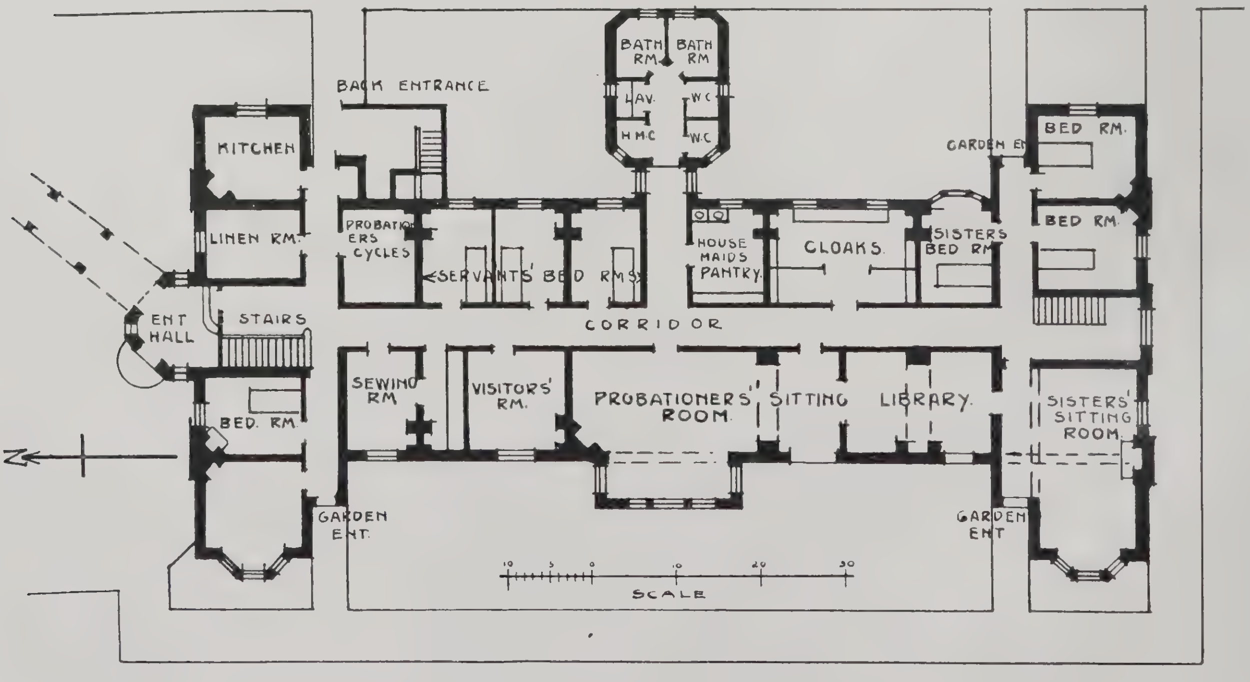
First-Premiated Design. Side Elevation to Sutherland Place.



Block Plan of First-Premiated Design. Arthur W. Worrall, Architect.



Block Plan of Second-Premiated Design. J.'A. Minty, A.R.I.B A., Architect.



Ground-Floor Plan of Second-Premiated Design. J. A. Minty, A.R.I.B.A., Architect.

NURSES' HOME, WOLVERHAMPTON GENERAL HOSPITAL.

March 20, 1907. Volume 25, No. 632

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

Notices.

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A Note in Regard to Competitions. WE desire to draw attention to the fact that since we have taken up the matter of competitions we have been successful in giving our readers the earliest—and in several cases—exclusive news and illustrations of designs for numerous important buildings in different parts of the Kingdom. The list of these, since the beginning of this year even, is a formidable one. It begins with Bangor University, and then follow in rapid succession—the Birmingham Council House extension, Barnsley Girls' School, the Soane Medallion design for a city hotel, the Grissell Gold Medal design for a grand-stand, artizans' dwellings at Child's Hill, Salford Royal Hospital extension, Henshaw's Blind Asylum School, Manchester, Goole Secondary School, Sunderland Children's Hospital, and, in this issue, the nurses' home at the Wolverhampton General Hospital. In each of the foregoing cases the selected design has been first published in our pages, and, as already stated, in some instances exclusively in our pages. We think our readers will appreciate this work which we are doing in their behalf. Competition is becoming the recognised channel for obtaining designs for the majority of important new buildings. It is useless to pursue the old line of bewailing such a state of things: we have to face the facts, and, taking human nature as it is, we may just as well recognise that there exists in the architectural profession a fight for existence no less acute than in any other profession to-day, and that, this being so, men will strive for their pocket's sake, in total disregard of any ethics. Moreover, quite apart from such considerations, it must be admitted that in many cases competition is really the best means of obtaining designs. It is not against the principle of competitions that we should protest, but against those instances of unfair conditions which are unfortunately still so frequent. To this side of the question much attention has been given in our columns, as also to the publication of summaries of conditions whenever it has been possible for us to do so; in this way ridding architects of the onus imposed on them by the practice of requiring deposits for conditions of competition, by enabling them to form at once an idea as to whether or not such and such competitions are worth their while to enter.

Ruskin Drawings. WHATEVER may be the opinion of Ruskin as an exponent of architectural principles, and however we may regard the effect of his teachings, there is no question about his claims as a draughtsman of architecture: indeed he must be counted among the very great draughtsmen, with an eloquent feeling for texture, and a soft strength of line which is as delightful as it is rare. His drawings have of course been made familiar through his books, but it is not often that there is an opportunity of seeing the originals: therefore, the collection which has been brought together at the Fine Art Society's gallery in Bond Street should be seen by all who have an interest in beautiful drawings. Here they are arranged chronologically, and it will be seen how the great writer matured in his draughtmanship. They are great drawings, these: and we recommend all architects to see them, for they must be *seen* to be appreciated; no descriptions of them can suffice, and reproductions even must necessarily lose much of the life of the original work

New, True, or Neither

One of the strongest points made by the advocates of registration is that it will place architects upon a satisfactory footing with plumbers who are thus distinguished. As matters now stand an architect can only become registered by qualifying as a plumber, and it is felt that this is a great hardship on men who have no special proclivities in this direction.

* * * * *

Opponents of registration, however, have a strong case against the idea that there is any necessity for special training of architects, when they point out that there are, in the provinces, many successful architects in a large way of practice who had no training, and who began their professional careers by hawking boots in old orange boxes mounted on perambulators, and by other kindred employments.

* * * * *

I know a foreman whose deep respect for drains compels him always to refer to them in terms of the feminine: "She come along that path, she turn that corner, and she run along that wall," he will say of socketed pipes, glazed and jointed in cement.

* * * * *

In Lord Brampton's reminiscences a story is told to instance the shrewdness of a certain eminent judge whose characteristics are the subject of the page. A friend, who was building himself a house, told him that he was much concerned lest his architect should not give adequate effect to certain practical qualities which he considered of importance. The great man's advice to him was to leave his architect alone. "If you do not interfere with him," he said, "he will probably give you all you could desire, but if you ply him with conditions and restrictions you will certainly not get what you want." From this anecdote it would appear that the depreciation of their professional attributes accorded to architects in the courts does not attach to the judges personally, but is part of the Law's majesty.

* * * * *

In "Country Cottages by Mr. J. H. Elder-Duncan, Messrs. Cassell & Co. have published a book of considerable interest to architects (particularly to those whose great works are illustrated for the enlightenment of an art-seeking public). But one wants to know, when is a house a cottage and when a mansion?

Some of the immense structures costing many thousands of pounds, but labelled "Cottage," remind one of the tour that Coleridge took with the Devil (or at least so S.T.C. said), in the course of which they came to a cottage with a double coach-house,

"And the Devil did grin,
For his favourite sin
Is the pride that apes humility."

THE LOOKER-ON.

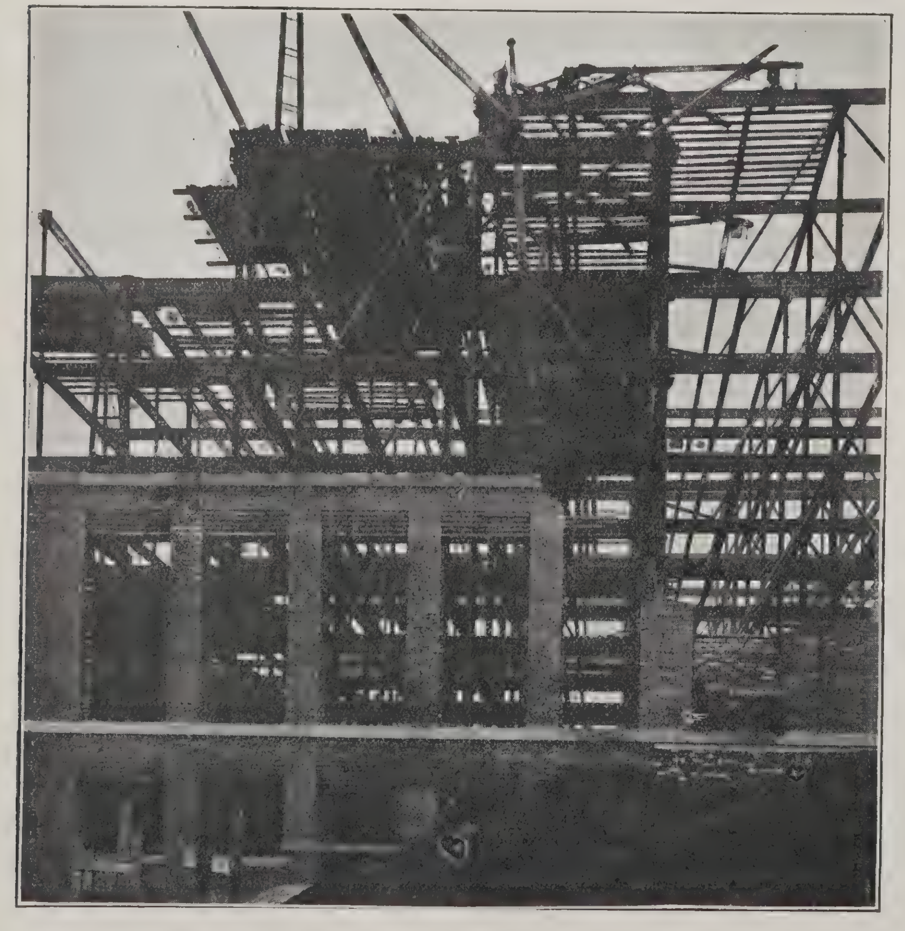
NEW COTTON MILLS IN LANCASHIRE.

By J. H. Crabtree.

In the matter of building new cotton mills, Lancashire has excelled all former enterprises. Only six years ago the staple industry of the county was far from satisfactory, the margin of profit being so small that it was scarcely worth while keeping the machinery running. There was talk of the industry being doomed, and of "cornerers" in New Orleans and New York holding our fortunes in their hands. It was just that which led Lancashire spinning-masters to see their need—new mills, new methods, new markets. An experiment was made by erecting half-a-dozen large mills, equipped with the best machinery. The rooms were lofty and much healthier for the workers than the older type, and were windowed with due regard to superabundance of sunlight. These new mills gained ground from the first day, welcome dividends followed, and Lancashire gave its benediction to the men who had thus pioneered a new era of prosperity. Then other business men launched forth, and so to-day there are no fewer than 75 new cotton mills either finished or in course of erection. No such marvellous growth has ever characterised any country's industrial progress. The share-capital is subscribed by contractors, managers, master-spinners, and manufacturers. The spindlage of each mill varies from 25,000 to 120,000; and a grand total of 6,000,000 spindles will be added by the new expansion. The mills are located in Oldham, Bolton, Rochdale, Manchester and suburbs. When fully at work, they will have cost £7,000,000, and will provide employment for 15,000 more operatives. New weaving-sheds are joining in the general move; 40,000 new looms are being installed, and 12,000 more weavers will be required.

This wave of prosperity naturally affects other trades. The mills are built of bricks, consequently the large extra demand for these makes things better for the manufacturers. The St. Helen's glass-trade is also appreciably affected. It must be so. Each mill has between 600 and 1,000 windows, and each window needs from eight to sixteen panes of thick glass. The iron and steel trade benefits likewise, for in the large rooms in these mills there are between 120 and 150 cast-iron pillars, about 12ft. high, besides girders and beams.

NEW AND OLD TYPES OF COTTON MILLS: "CAIRO" AND "BANGOR" MILLS, OLDHAM.



TEXAS MILL, ASHTON-UNDER-LYNE, IN COURSE OF ERECTION.

DEVELOPMENT IN MILL BUILDING

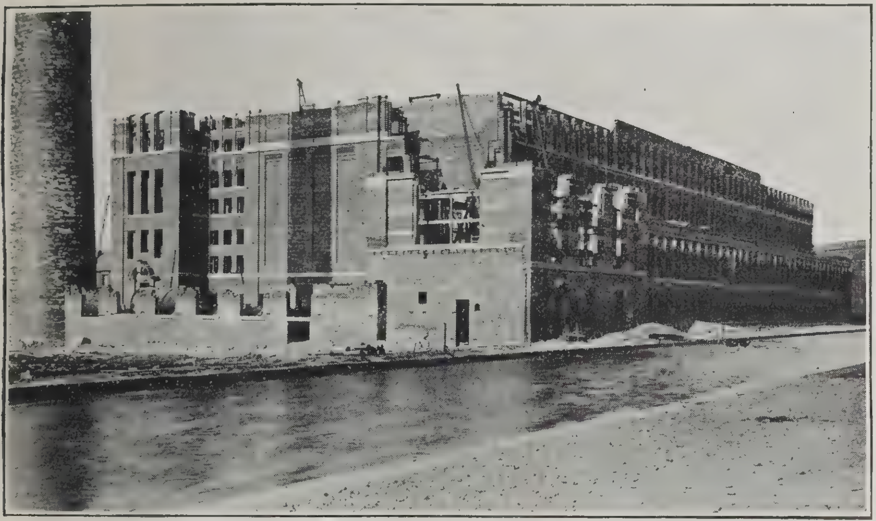
By Harold G. Holt.

The first cotton mills were of small dimensions and were driven by water-wheels. With the invention of the steam-engine great developments in mill-building took place. The early mills were long, low and narrow, their floors being of light wooden construction and only 7ft. or 8ft. in height; the windows were small and divided by bars into diminutive squares. On the use of cast-iron becoming more general throughout the country, columns were introduced at intermediate points to carry the main wooden girders; thus a type of construction was evolved that remains to the present day in various forms. A very common adaptation of this system used at the present time for small mills is that in which rolled steel joists take the place of the huge timber beams formerly so much in vogue, wooden stiffeners being bolted to these, or else angle-irons riveted along them, on which rest the smaller wood joists for the general flooring.

About 1870 a type of construction came into being with main girders of cast-iron supported on cast-iron columns. From these girders sprang flat brick arches, whose haunches were filled up with concrete to a level slightly above the arch crowns, the floors being finished by boarding. Where large spans occurred the girders were usually tied together by wrought-iron tie-rods; cast-iron arch ribs were also often introduced. In this type consisted the first so-called "fireproof" floor construction. The fallacy of the name, however, has been repeatedly demonstrated.

The most modern type of construction, and the one in general use with various modifications to suit circumstances, consists of rolled steel joists for main girders, and also for cross girders where they occur, as is often the case: these are usually wholly covered with concrete except the bottom flanges, which are generally plastered only; the general flooring is of 7ins. or 8ins. of concrete, having small rolled steel joists embedded therein, the floors being plastered on the underside to give greater reflection of light. The mills are divided into "bays," usually now about 21ft. to 22ft. square. Cast-iron columns support the lines of main cross beams. The floors are usually of the following heights:—Ground floor

DELTA MILL, ROYTON. STOTT AND SONS, ARCHITECTS.



REGENT MILL, FAILSWORTH, IN COURSE OF ERECTION.
JOSEPH STOTT AND SON, ARCHITECTS.

SOUDAN MILL, MIDDLETON. JOSEPH STOTT AND SON, ARCHITECTS.

15ft, upper floors 14ft., or perhaps 13ft. 6ins. Roofs are flat, of concrete, covered with asphalt. The windows are often of great size, 15ft. wide being a common opening; these are usually spanned by cast-iron lintels having cast-iron mullions as supports in the centre. The window frames are of wood, fixed lights having hoppers to swing; iron window frames are not often used.

The accompanying illustrations show some of these new Lancashire cotton mills. The architects of the Regent Mill, at Failsworth, were Messrs. Joseph Stott & Son, of Oldham, and the contractors Messrs. S. & J. Smethurst, of Oldham. Delta Mill, Royton—architects, Messrs. Stott & Sons, Manchester; contractors, Messrs. Smethurst. Soudan Mill, Middleton—architects, Messrs. Joseph Stott & Son, Oldham; contractors, the Soudan Mill Co., Ltd., Middleton.

THE BUILDING TRADES EXHIBITION.

Very great interest is being taken in the forthcoming International Building Trades' Exhibition, which is to be held at Olympia this year from April 6th to 20th. The success of the exhibition is now assured, the whole of the available space having been allotted for exhibits—main hall, gallery, and annexe.

This exhibition, which is held every two years, has always seemed to us to be a very useful and interesting one for architects, builders, and all connected with the building trades. We have therefore arranged to furnish our readers with a full account of it. In our issue for April 3rd we shall give a guide to the chief stalls, so that the visitor may have beforehand some idea of what he should make a point of seeing. Then on April 10th we shall publish a double number, giving a report of the opening of the exhibition on the preceding Saturday, with views of the stalls, and full particulars of the chief exhibits. Finally, in our issue for April 17th, we shall give a further account of the exhibits, grouped together in classes, and dealt with in a manner that will render the account not only of immediate interest in connection with the exhibition, but also of some service for reference later.

Free Passes for Readers.

We have come to an arrangement with the promoters by which our readers will be entitled to a free pass to the exhibition. Application for such passes should be made, in writing, to The Manager, Builders' Journal, 6, Great New Street, London, E.C.

The Opening Ceremony.

The exhibition will be formally declared open at 12 noon on Saturday, April 6th, by the Rt. Hon. the Lord Mayor, Sir William Treloar, a vote of thanks to whom will be moved by Sir Aston Webb, R.A., and seconded by Mr. F. L. Dove, L.C.C., president of the Institute of Builders. The exhibition will remain open every weekday from 10 a.m. to 10 p.m. until (and including) April 20th.

THE ACADEMY.

The sending-in day for architectural drawings for this year's Royal Academy exhibition is Thursday, March 28th, from 7 a.m. to 10 p.m.

All works must be under glass, in gilt frames, with the title of the work and the name and address of the author written on the back, and the same information given on a label tied by a string so to hang over the front. A form must also be sent to the secretary giving the titles of all works submitted, and the name and address of the author. (Forms and labels can be obtained on application to the secretary of the Royal Academy, Burlington House, Piccadilly, W., all applications to be accompanied by a stamped addressed envelope.)

Not more than three separate works can be submitted by any one person.

As in former years, we shall be glad to receive any architectural works for exhibition and to deliver them free of charge at the Academy, after reproducing such of them as we desire to publish.

Liverpool Architectural Society.—Mr. John Belcher, A.R.A., was not able to read his paper on Monday: it will now be given some time in May next.

R.I.B.A.

Two papers on Libraries.

A meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W., the chair being occupied by Mr. Leonard Stokes, vice-president.

Two papers on "Libraries" were read by Mr. Henry T. Hare, F.R.I.B.A., and Mr. J. Duff Brown, chief librarian of the Islington Public Libraries.

Mr. Hare's Paper.

Mr. Hare said that the public library had been the occasion for many competitions, and it might have been expected that, with so much effort concentrated on a comparatively simple subject, some very brilliant type of plan or design would have been evolved. This, however, had not been the case, for not one could claim to be the last word in library design. If the problem were dealt with from the initiatory stage (*i.e.* the selection of the site) under proper advice a much better result might in most cases be obtained. Often in a library for a moderately-sized district accommodation was asked for twenty or thirty thousand books in the lending department. This needed a very large room, and was quite unnecessary. A large proportion of the books, particularly fiction, quickly went out of date. Shelving for ten to fifteen thousand volumes would generally be sufficient for an average district; it might be supplemented by an adequate store-room, where books could be economically housed. The reference library also was often over-sized: for an average library, accommodation for from twenty to thirty readers was ample. The bulk of the books might be housed in a stack-room adjoining the reference-room. The usual treatment of the reading-room was susceptible of much improvement. The ideal reading-room should partake more of the nature of a hall, with probably an open roof, or at all events considerable height. It should permit of the spacing of the furniture very widely, allowing ample gangway for persons to move about without disturbing the readers.

Mr. Hare suggested that the lending library might be included in the reading-room, so reducing the typical library to two main public rooms—namely, a general reading-room and library, and a smaller room opening out of it for reference readers. This arrangement would obviate the necessity for passages, entrance-halls and staircases, and all available funds could be devoted to those parts of the building actually used by the public.

Mr. Hare touched on the "open access" and "indicator" systems, and showed the manner in which the adoption of either the one or the other must influence the design of the building. The necessity for the supervision of the lending library in all its parts from a central fixed point appeared to suggest as the ideal plan for this room a semicircular form with radiating bookcases. On confined and irregular sites such a plan, however, was very difficult, if not quite impossible. The importance of supervision by the staff should not be exaggerated, as the public using the library largely supervised themselves.

A recent development in the direction of rendering libraries more widely useful as educational centres, where lectures could be given, had introduced a new element in the planning, separate entrances and exits having to be provided. From this point of view, it was open to question whether the familiar news-room, with its costly fittings, was really a necessity. In the new libraries being built in Islington no newspaper-room was being provided, but only a large general reading-room containing magazines and periodicals.

In conclusion, Mr. Hare urged the desirability of reconsidering our views of the necessities of a public library in the direction of a much more simple type of building—one large hall with very ample space both in floor area and cubic capacity. This would be economical, comfortable and convenient, and would lend itself also to dignified architectural treatment—the latter of the first importance from an educational point of view.

Mr. Duff Brown's Paper.

Mr. J. Duff Brown dealt with library planning as affected by modern library policy and interior arrangements, and discussed the question of finance, lamenting the fact that the English Libraries Acts did not specify the amount which should be borrowed for building purposes, as in the case of the Scotch Acts, which provided that only one-fourth part of the income from the library rate, capitalised at twenty years' purchase, should be borrowed, thus putting a definite check upon the mistakes and extravagances of committees. In most cases throughout England this reasonable proportion of the library rate had been enormously exceeded, with the result that many of the buildings possessed architectural merits, but as libraries were failures. The craze for overbuilding, because the money was easily obtained, had been responsible for numerous cases of library buildings which were collections of bricks rather than of books, and whose equipment was so meagre, and funds so scarce, that the hours had to be shortened in order to avoid a gas bill which would extinguish the penny rate!

The author went on to consider the following points, which he put forward as suggestions for discussion:—

Is it advisable in the interests of progress and efficiency to standardise library plans and methods by adopting one uniform system for everything? The author hoped that the factors which were being sought to bring about this uniformity would never be discovered, and that architects would continue to design, and librarians to invent, fresh solutions of every problem presented.

Systematic classification, by introducing more scientific methods of arrangement, would necessitate some alteration in the structure and spacing of bookshelves. Exact classification had brought about changes in the height, spacing and adjustability of bookcases; and had had some influence in bringing into use the "open-access" system, which the author predicted would, within the next few years, become all but universal. The "open-access" system had been the means of important modifications in planning. In both reference and lending departments the bookcases must be easily accessible from the floor without the use of steps, and the spacing of standard bookcases when facing each other must be arranged so that readers can stand back to back at the shelves and still leave sufficient gangway for others to pass. This extra space was very nearly balanced by throwing into the room the lobby usually reserved in front of indicators and similar closed systems. If the library were periodically weeded of obsolete books, congestion would only arise in a few cases and for a brief period. The best shelving for a public library was in the homes of the borrowers, and for that reason elaborate efforts to find accommodation for books which were generally in circulation was a mistake.

Another department in which great changes were certain to happen was the reference library. Its function in the past had been to collect books rather than to utilise them for purposes of research; it had become rather a book museum than a literary workshop. The author advocated complete isolation for students in the reference library, so that everyone should have a reserved self-contained place at a table, with plenty of accommodation for spare books and table space sufficient for the arrangement and spreading-out of reference works and papers.

Another matter which might influence planning was the question of limiting the supply of newspapers. Many libraries had cut down the supply. In some the provision was limited to the exhibition of the "situations vacant" columns cut from the morning papers; in one place newspapers were not taken at all. By limiting newspapers considerable economy was effected in the cost of space, stands and fittings, lighting, staff, &c.

A vote of thanks was accorded the readers of the papers on the motion of Mr. Maurice B. Adams, seconded by Mr. E. A. Baker.

Correspondence.

Competition for Plymouth Library, Museum and Art Gallery.

To the Editor of The Builders' Journal.

Sir,—I think you are hardly fair to local architects in your comments upon the recent competition for the Plymouth library. The criticism which you ascribe to disappointed competitors was, in fact, contained in the leading article of a local paper. The unsuccessful competitors may have been disappointed, but they have not been guilty of the bad taste with which you saddle them.—Yours truly,

ONE OF THE NUMBER.

[We ourselves did not saddle the competitors with anything. The comment referred to was made by the "Western Morning News," and we clearly stated that fact, giving the words in parenthesis. That the criticism was not just, we think the publication of the design in our pages will have made abundantly evident to those in a position to judge.—Ed. B.J.]

Competition Drawings.

To the Editor of The Builders' Journal.

Sir,—As a competitor in several recent competitions in various parts of the Kingdom I should be glad to know if some system could be instituted whereby competitors might know of the safe arrival of their drawings. I would suggest that a motto be placed in a sealed, stamped and addressed envelope, which, upon the parcel of drawings being opened, should be forwarded to your Journal (which has done so much of late to reform the conditions governing competitions) and that you publish the list of mottoes thus received, and so enable competitors to be certain of the safe delivery of their drawings. At present they seem to be at the tender mercy of the railway companies.—Yours truly,

COMPETITOR.

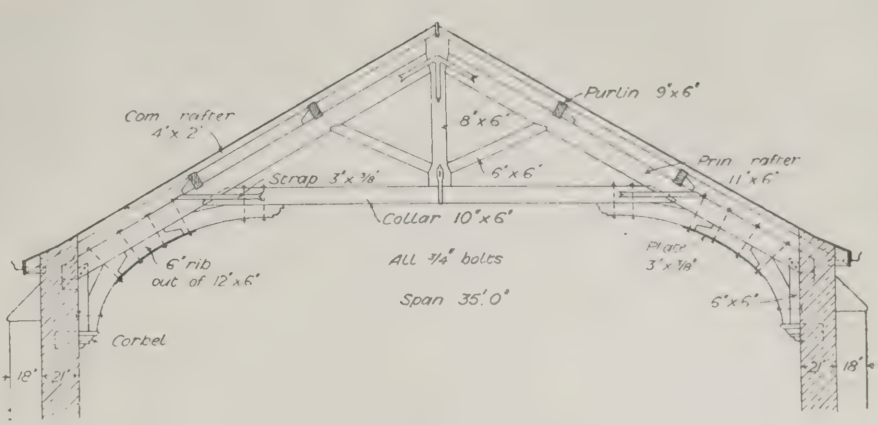
Enquiries Answered.

Roof Truss for 35ft. span.

BUILDER writes: "I have a roof to construct, 35ft. span and 17ft. 6ins. to wall-plate. I am anxious to dispense with tie-beam or rod in principals. The walls are 21ins. thick, with buttresses projecting an additional 18ins. Kindly suggest the best construction to adopt."

It is much better for a correspondent to give full information and leave the editor to condense it in framing the question. In the present case it is not stated whether the roof is for a church, a town hall, a drill hall or a barn; and no mention is made of the pitch, the nature of covering, or the distance of trusses, centre to centre. In the circumstances, therefore, any reply must be adopted with caution. A truss suitable for an average case is shown by the accompanying illustration. It is shown to a 30 degs. pitch, but may be made 45 degs. if desired.

HENRY ADAMS.

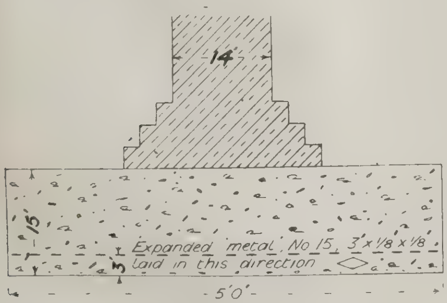


ROOF TRUSS FOR 35FT. SPAN.

Foundations on Made Ground.

SUBSCRIBER writes: "It is proposed to build a house three storeys high on a site consisting of sand and crag, but it is found, on digging trial holes and from local information, that the ground has been worked more or less all over for coprolite, the pits being about 7ft. to 12ft. deep, about 50 to 70 years old, and the original sand and crag put back. As large cellars are not required, I propose putting in concrete trenches 5ft. wide to all walls just below the level of the ground 15ins. thick, reinforced with one layer of expanded metal lathing 3ins. from the bottom. Would this make a satisfactory foundation?"

Assuming that the 14-in. wall is loaded to its full capacity, there will be a pressure of about 3 tons per ft. super. on top of the footings, or $3 \times 1\frac{1}{8} = 3{\cdot}375$ tons per ft. run. Taking the concrete as 15ins. deep and 5ft. wide, the weight per ft. run will be $\frac{1{\cdot}25 \times 5 \times 126}{2240} = {\cdot}351$, or together $3{\cdot}375 + {\cdot}351 = 3{\cdot}726$ tons per ft. run. Omitting the weight of the brick footings, and dividing this amount by the width of concrete, gives $\frac{3{\cdot}726}{5} = {\cdot}745$ tons per sq. ft. pressure on the made ground. The section shown below will probably be suitable if the site is not subject to alternate flooding and drought. Coprolites generally occur in a gault clay, and were extensively dug for about the years 1860 to 1870. This soil is not good for building upon, as it has all the disadvantages inherent in clay, and the expansion and contraction with alternations of moisture cause movement of the walls. The expanded metal should be lapped at the junctions, and especially at the angles, to tie the work well together.



HENRY ADAMS.

Contractor and Mortgagee.

CHESTER.—X. Y. Z. writes: "A builder entered into a contract with the owner of some land to build six houses. He has received all his certificates from the owner's architect, and has carried out his contract to the letter. The certificates, however, have only partly been met, and the owner owes the contractor something like £500. The time has also expired for payment of the balance retained, which has also been certified for. It appears that the owner has been borrowing the money wherewith to build, but has been paying the contractor in part only, presumably using for other purposes the money borrowed. The mortgagees who have been finding this money have now taken possession. Interest and ground rent not having been paid, the property has been advertised for auction, but the mortgagees state that it has been sold privately for a sum of money that barely covers the advances. The contract is of an earlier date than the mortgage. (1) Has the contractor any claim upon the mortgagee who has sold the property? (2) Where does the contractor actually stand with relation to both the employer and the mortgagee? (3) Nothing is mentioned in the contract as to it being a charge upon the houses, but wouldn't such a charge be implied?"

The contractor should consult his solicitor without delay, as I fear he is in a very awkward position. (1) I am of opinion that the mortgagee need not recognise the contractor in any way. (2) The contractor's remedy is against his employer, the mortgagor only. (3) No, there is, I believe, no implied lien on the property, but as this is an obscure legal point I advise you to take proper legal advice at once.

F. S. I.

Foundations for Houses on Beach Ballast

HORLEY.—X. Y. writes: "I shall be glad of any data as to the form and depth of foundations for houses built upon beach ballast on the coast: the ballast extends many feet, and the site is land given up by the sea many years ago. Should the ordinary concrete foundations be adopted at the usual depth of, say, 2ft. or 3ft.?"

The right solution of all foundation problems depends so entirely upon varying conditions, which must be studied on the spot, that it is almost impossible to give a satisfactory answer to such a question as this; experience alone can judge. It may be well, however, to remind you that all ballast was originally beach ballast (either sea or river) and that your remark of "many" years is vague. If the ballast is binding (*i.e.*, may be excavated without the sides of the trenches taking naturally an angle of repose other than the vertical), it may be safely treated as an ordinary gravel foundation. If, however, it is loose, and with little sand and grit, it would be necessary to know the level at which water is reached and whether it is immune from the scouring action of the sea. Ballast is practically incompressible under weight, but there might then be risk of its escaping laterally from beneath the foundations. Increased depth would probably be effective, but would, of course, add enormously to the expense, if the excavations would not stand, and were also below the water level. It would probably be safe to treat the foundations in the ordinary way.

G.

Roofing of Summer House.

MANCHESTER.—A. Y. R. writes: "I propose to slate the exterior vertical faces of a small summer-house with oak shingles. (1) What size and thickness is generally used? (2) Is it advisable to board the framing for fixing shingles, or will slater's laths do? (3) What lap is generally given? (4) Would you advise staining or leaving the oak to weather itself? I also propose to roof with oak boards. (5) Is it better to use some preparation on the boards to keep out the weather or not? (6) What section and size is generally used? Kindly give any further particulars you can with regard to both shingles and boards."

(1 and 3) Shingles are made of oak, chestnut or cypress, and are used in precisely the same manner as plain tiles. (2) It is advisable to fix them (two pieces to each shingle) to boarding rather than to battens or laths. Shingles may be bought at about 10s. per 100. (4) Purely a matter of taste. Personally I much doubt whether staining, tarring or painting really lengthens the life of timber work. (5) The roof slope should be of not less than, say, 45 degs. The outer side of the roof boards may be tarred if desired—do not tar both sides, and do not dip them in creosote (which has little preservative effect save on sappy and

immature timber). (6) Why not use ordinary "weatherboarding"—this is thinner on one edge than on the other—tapering in section from $\frac{3}{8}$in. to $\frac{3}{16}$in., and from 5ins. to 7ins. wide.

F. S. I.

New Zealand Kauri Pine.

LIVERPOOL.—W. and G. write: "What is New Zealand Kauri pine most suitable for? What are the points to guard against in using it? We find that in door frames and inside woodwork it twists and shrinks, and more so in length than width, which is unusual."

My opinion of Kauri pine is that, if carefully selected from well-seasoned planks that have kept straight and true during seasoning, it is suited admirably for first-class joiner's work, provided the cost of labour is not prohibitive. Like all other woods, some of it will cast after being cut out, and unless it is to be used for fixed work this wood should be thrown out before any labour is bestowed on it. Some years ago I had to use Kauri pine for all the best interior joinery of a large mansion, and it was to the satisfaction of architect and clerk of works. The doors (about 40 or 50), door jambs, partitions, lavatory fittings, staircases, linings, &c., were made of it, all framings being knocked together and stacked in a drying-room for at least three months before fitting and wedging up, and the whole of the material for staircases, &c., cut off and similarly stacked before working; and the defects which showed after being taken from the drying-room were no greater than with any other kind of wood. I found Kauri pine to be a wood which could be got up to a very nice face, being adapted for either painting, staining and varnishing or French polishing; it wears well, and holds well with glue; it is also very free from sap, shakes and knots; but the labour on it costs quite double that on St. Petersburg or Archangel.

W. Y.

Woodwork for Church.

GREENOCK.—CONSTANT READER writes: "Being engaged in reseating a church, I am desirous of having reliable information regarding different woods, and their treatment (stain, varnish, &c.). (1) Is English elm difficult to work? (2) Would beeswax, turpentine and polishing on the natural wood be a suitable treatment for the same? (3) Is Kauri pine, owing to its shrinking peculiarities, suitable for such a purpose? (4) Is there anything to remember regarding Kauri as to varnish, &c.?"

(1) If for joinery or cabinet work, English elm is a difficult wood to work, as for such purposes it must be very dry, and in drying twists and warps considerably, and consequently a large amount proportionately has to be spent on labour in straightening it. (2) Beeswax and turpentine, with a little powdered resin to harden same, will be a suitable polish if the work is got up to a smooth surface. (3) Kauri pine, if properly selected and well seasoned, is most suitable for church seating, provided care is taken to bring it up to a suitable face. (4) Work for varnishing should be well cleaned off, glass-papered the same way as the grain with very fine glass-paper, care being taken not to cross the grain with the glass-paper; take off all dust with duster, size with clean size, and give a second coat with best copal varnish.

W. Y.

IN PARLIAMENT.

(By our Press Gallery Representative.)

Welsh Slates and German Tariff.

Some days ago in the House of Commons Mr. Remnant raised the question of the German tariff on Welsh slates. He asked the President of the Board of Trade what were the objections raised by Welsh slate quarry proprietors to the German tariff of 1906; what representations were made to the German Government in view of these objections; what concessions were ultimately accorded; and how did the new duty on slates, obtained as the result of these negotiations, compare with the rates before the present German tariff came into operation. He also asked if the President of the Board of Trade could state the value of the exports of Welsh slates to Germany in each of the last five years.

Mr. Lloyd George, in reply, said: "Welsh slate quarry proprietors objected to the provision in the new conventional German tariff that blue or blue-grey slates of less than 5 millimetres thickness must be punched with a hole at a certain distance from the edge in order to claim admittance at the reduced rate of 65 pfennigs applicable to roofing slates, and to avoid the higher rate of 1 mark applicable to table slates. If this provision had been put into operation it would have seriously handicapped Welsh slates in competition with Austrian. As the result of representations made to the German Government the regulation objected to has been withdrawn and practically the whole of the roofing slates exported are now admitted at the lower rate. Full particulars are given in the Board of Trade Journal for December 27, 1906. The rate of duty on roofing slates under the old German tariff was 50 pfennigs."

The right hon. gentleman also furnished the following statement of the registered exports of slates of British and Irish mauufacture from the United Kingdom and from Welsh ports to Germany during the years 1902 to 1906 inclusive:—

Years.	From the United Kingdom, including Welsh Ports.		From Welsh Ports.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Tons.	£
1902	24,851	99,958	24,841	99,918
1903	19,977	83,714	19,925	83,519
1904	18,918	81,660	18,917	8 ,640
1905	17,206	74,001	17,206	74,001
1906	15,657	66,202	15,655	66,230

Slates exported from ports in Wales may be regarded as Welsh slates.

Holyrood Chapel.

Asked whether the ruins of Holyrood Chapel, Edinburgh, had been and were now being protected, Mr. Harcourt said he was glad to say that Professor Lethaby in his recent report on the ruins of Holyrood, had added these words:—"I examined the tops of the walls and the broken pillars and found that they were carefully kept, having been stopped up with cement in a thorough manner. The roof over the south aisle is also very sound and well kept."

War Office Buildings.

From other questions answered in the House, it may be gathered that consideration is being given to a proposal to erect buildings for the Royal Army Medical Corps on Eltham Common, and that work in connection with the new hospital for Tidworth Barracks, Salisbury Plain, may shortly taken in hand.

Notes on Competitions

Dundee Technical Institute.

The Technical Institute Committee decided to take no action in regard to the letter from the Dundee Institute of Architecture, Science and Art, protesting against the conditions of the competition for the façade of the new structure in Bell Street. The competition closed on Friday last.

Dudley Library.

Mr. A. Dennis Thacker, hon. secretary of the Birmingham Architectural Association, points out that the conditions of this competition are "not in harmony with the usual professional practice in such cases." Representations to this effect have been made by the Birmingham Architectural Association, but no intimation has yet been received to indicate that any alteration of amendment of the conditions will be made. Until a reply is forthcoming it is hoped that architects will refrain from submitting designs.

Scottish National Exhibition, 1908.

In the conditions of this competition it is stated that the buildings for general exhibits are to be of not less than 100,000ft. super., and 20,000ft. super. for machinery and exhibits in motion: while the Fine Arts building is to have not less than 1,500 lin. ft. of wall-space, capable of extension to 2,000 lin. ft. A concert hall seated for 2,000 people is to be provided. The total cost of the buildings is not to exceed £20,000, exclusive of electric-light, gas, water and other supply piping. Designs are to be in the hands of the secretary by May 11th. The authors of the designs placed first and second will each receive £100, and there will be a third premium of £75. Mr. J. J. Burnet, A.R.S.A., F.R.I.B.A., is the assessor. The grounds of the exhibition consist of the fine old park and gardens of Saughton Hall.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
March 28	LIBRARY AT FAILSWORTH (to cost £3,000). Premiums of £20 and £10. Conditions from H. C. Broome, clerk, Council Offices, Failsworth. Deposit, One guinea.
March 30	LIBRARY AT DUDLEY.—Limited to architects practising within 50 miles. Conditions from H. C. Brettell, town clerk, Dudley.
March 30	PRESBYTERIAN CHURCH AT ROKER, SUNDERLAND.—Premiums of £25 and £15. Particulars from George W. Bain, 46, John Street, Sunderland. Summary in "Builders' Journal," Feb. 20
April 2	EXHIBITION COTTAGES AT SHEFFIELD & NEWCASTLE. Particulars from Henry R. Aldridge, 45, Bank Street, Sheffield.
April 30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May 11	SCOTTISH NATIONAL EXHIBITION AT EDINBURGH.—Premiums of £100 and £75. Conditions from J. Marchbank, 45 York Place, Edinburgh, Deposit, One guinea.
May 17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.

WOLVERHAMPTON NURSES' HOME COMPETITION.

More than six months ago the Board of Management of the Wolverhampton General Hospital advertised for competitive designs for a nurses' home. Amended conditions and replies to enquiries extended the sending-in date for the drawings to the middle of January, and the award was made known last week—two months after the submission of plans. This delay has been partially caused through the illness of the assessor, and also by the Board of Management, who revised and simplified the conditions in the middle of the competition, owing to the large number of queries raised by architects. The number of clever schemes which the assessor had to examine also assisted in postponing the award, as 148 designs were received. Mr. H. R. Price, of Manchester, adjudicated upon the drawings, at the request of the Board. His task has not been an easy one, as the 14 schemes in the final selection are remarkable for similarity of plan, with simple elevations and a minimum of cube contents, so that only on a question of minor points could the assessor arrive at his decision. All the designs in the short leet were on exhibition to competitors for a few days only during the past week in the library of the Wolverhampton General Hospital. Judging by an examination of these various schemes, the award is satisfactory both to the competitors and to the Board of Management. It is interesting to note that a local architect has been successful and that prior to the competition the members of the profession in the district endeavoured to limit the competition to architects in practice in Wolverhampton. The competition was conducted on fair and proper lines by the promoters of the scheme, who even insured the drawings, while in their possession, for £10 per set—rather a low estimate considering the time and labour in draughtsmanship displayed by many of the designs. The scheme placed first merits that position in every respect, when compared with the other sets.

Site and Conditions.

The ground available for the proposed home adjoins the main building of the General Hospital, with which the new building had to be connected by a covered way. A two-storeyed building was suggested, and the list of rooms required included the following :—A general sitting-room for probationers and a similar room for ten sisters, a library, and a small sitting-room for visitors. The bedroom accommodation appeared to be the most difficult to plan so as to have as few bedrooms as possible on the ground floor: about 40 were required for probationers and 9 for sisters, also 3 for servants. A sitting-room and bedroom had to be provided for the home sister. Ample lavatory and bathroom accommodation in proportion to the bedrooms, with cloak-room, housemaids' closets, linen cupboards, sewing room and box-room were also required, as well as kitchen, pantry, &c., and cycle room. The disposition of he rooms was left entirely with competitors so far as position, aspect and area were concerned.

The conditions were clear and to the point, and the latitude allowed in the early tages of the competition, when the more experienced architects had drafted their schemes, was materially altered owing to the large number of questions, with their replies, which ultimately placed all the competitors more or less on an equal footing. No scheme which is remarkable for its originality of plan is the outcome—all the designs are on the usual lines for such institutions. The suggested cost of the building is £5,000, a reasonable sum considering the requirements, though the elevations have had to suffer. No scheme showing much stonework in its architectural treatment was seriously considered by the assessor, although the hospital connected with a covered passage to the nurses' home is a severely Classic building, built of stone with brick filling, and has set the key for style to many of the designs.

Design Placed First.

This position was awarded by the assessor to the design submitted by Mr. Arthur W. Worrall, of Queen's Chambers, North Street, Wolverhampton. We illustrate the design on our centre plate this week. Considering plans, elevations, cube contents and suitability to the site, this scheme no doubt has many points in its favour which more elaborate designs lacked. Taken as a whole, the plans provide practically everything demanded by the conditions, together with certain additional features which experience has suggested would be an advantage in completing the equipment of the institution. The *motif* of the plan has been to so arrange the building on the site that the various sitting-rooms and bedrooms should receive direct sunlight during some portion of the day and that all corridors and staircases should be well-lighted. Advantage has therefore been taken of the south front for the sisters' and probationers' sitting-rooms; each of these rooms has a bay window, with a verandah common to both between the bays. The next important rooms, the home sister's rooms and sewing-room, are situated on the west front facing Vicarage Road, this being the best available aspect and outlook. The restriction in the conditions that there must be no entrance from the adjacent streets practically determined the position of the entrances to the building, as access to the home can only be obtained through the lodge entrance in Cleveland Road. The principal entrance, therefore, has been placed in the centre of the west front so that it will only be necessary to extend the drive past the present hospital entrance to provide direct access from the lodge to the new home. All the internal stairs are well placed and planned in straight flights without winders, with an external door on the ground floor which would afford ready means of escape in case of fire. The majority of the bedrooms are on the first and second floors, and it will be noted that each bedroom is of good shape and conveniently arranged with regard to the relation of the door, bed, fireplace and window. A small wardrobe or cupboard for hanging clothes is shown in each bedroom plan between the chimney-breast and external wall. Only one room appears to be sacrificed to convenience, and that is the lavatory and cloaks, adjoining the hall on the ground floor, which would be better placed where the servants' bedrooms are shown, and near the side entrance door. The sanitary annexes, isolated from the main building by a cross-ventilated corridor, are a commendable feature in this scheme. The elevations are quietly designed, and in harmony with the adjoining hospital. If cost permitted, the main pediments could be relieved of their baldness by the addition, in the centre only, of some architectural ornament. One of the pediments to the extreme east, on the Sutherland Place elevation, does not mitre happily with the window heads as a lintel, and it would assist the composition to omit this feature, and thus enhance the pediment over the covered verandah.

Design Placed Second.

This has been submitted by Mr. J. A. Minty, A.R.I.B.A., of 35, Craven Street, London, who, unfortunately, receives no premium—none being offered according to the conditions of the competition, although this design, like many others, is worthy of some remuneration. The ground plan illustrated shows in detail the general arrangement of the scheme, with disconnected sanitary block and conveniently grouped sitting-rooms on the west front. Against the plan is the lighting of the main corridor and the narrow end corridors, coupled with their length, also the number of entrances and the absence of one main entrance—the entrance shown adjoining the covered way is very cramped and too distant for visitors from the public rooms. The supporting and carrying over of the chimney-breasts on the various floors would not work well in practice; although possible, it is not always satisfactory, especially where cost has to be considered; it is preferable to carry wall over wall in buildings of a domestic nature like a nurses' home. In design the elevations are on simple lines, strongly drawn, but without proportion in the windows, and the spacing of the brick and stone-work could have been improved upon.

Other Designs.

The remaining designs in the final selection included many able and well-balanced plans with appropriate elevations, though the keenness for small cube contents was in many cases gained through ridiculously narrow passages, called "corridors", with equally narrow stairs, and the heights of the various floors would not be sanctioned by any corporation.

Many designs were utilitarian in the extreme sense of the word, being devoid of any moulding, stone, or ornamental character whatever—simply four square walls, and a roof for the building, which had to be erected on a main thoroughfare.

Among the most satisfactory designs was the work of the following architects, who were all in the final selection, though not placed quite in their order of merit: Mr. Vernon Hodge, of Teddington; Messrs. Henry Crouch and Ashley Kilby, of London; Mr. Joseph Wood, of Leeds; Mr. Frank Lishman, of London; Mr. Q. Mangnall Bluhmn, St. Anne's-on-Sea; Messrs. Hall and Phillips, London; Mr. Landell Nicholson, Newcastle-on-Tyne.

Broseley Tiles.—It should be borne in mind that tiles sold as "Broseley colour" made in other districts are not the same as tiles branded "Broseley" on the back. These latter are made of a very special clay peculiar to the immediate neighbourhood of Broseley, Shropshire. One of the best brands is "Lightmoor" Broseley, made by the Coalbrookdale Co., Ltd., of Coalbrookdale, and Rathbone Place, W.

MR. BLOMFIELD'S ACADEMY LECTURES.

The Limitations of the Arts.

Mr. Reginald Blomfield, A.R.A., delivered his fourth and concluding lecture to the Royal Academy students on Monday, March 4th. Taking as his subject "The Limitations of the Arts," he said there were few problems more difficult than the elucidation of the ends and aims of the different arts. The critic of 1850 was concerned with the moral qualities of the artists, or with the literary possibilities of their work. Since then much knowledge had been expounded in the minute discrimination of technique and the appreciation of the value of paintings which has profited the connoisseur at the expense of the artist. There still seemed some ground, therefore, for attempting to ascertain, on the old lines, the attitude an artist was justified in assuming towards his work. He would start with the fact that certain human creations created a thrill within us. "They set ringing within us that little bell of emotion that responds to the touch of genius." He would attempt to give some account of the teachings of great thinkers of the past in regard to the relations and differentiations of the Arts, drawing some conclusions for their own guidance. In doing so he limited himself to the writings of Plato, Aristotle and Lessing.

Plato's Outlook.

Plato had an ingrained suspicion of Art. It was with him a matter of imitation, and therefore to be eliminated from his ideal state. Art did not appear until the tenth book of the "Republic," and there the message of the architect was dismissed as appealing to the lowest elements of our being. "Imitative art," says Plato, "is far from the truth when it discharges its function; and for no true or healthy purpose it attaches and devotes itself to that element in us which is far removed from wisdom." This conclusion was either superb irony or the result of too unyielding logic. But then Plato subordinated all Art—even music—to his passion for perfecting the soul. He banished all Arts from his ideal state, except such as had an ethical value. He feared their seductive influence. But this conclusion was inimical to his other opinion that each art should be perfect within itself. If a picture were true to its intention it was illogical to reject it on ethical grounds. Whatever value might be attached to Plato's opinions, they could not satisfy artists.

Aristotle

was far more sympathetic, and he was the first to admit that, under certain aspects, Art had its proper place in the scheme of life. But when we came to details his view was disappointing, for he was occupied almost entirely with poetry. The aim of Art was to show human emotion in action. Sculpture and poetry might do this in a limited sense; architecture to Aristotle did not, and therefore was disregarded: moreover the impression made on the spectator was, in his view, the end of Art. Thus there was a wide difference between the ancient view that the artist simply contributed to the wealth of life, and the modern one that the artist, in addition, might attempt a realisation of himself.

It was fortunate that in suceeding ages Literature left the Arts severely alone. Artists made mistakes, but they were at least undisturbed by hasty generalisation on the relation of poetry to the Arts. In the 18th century, however, the literary man arose and annexed the whole domain of the Arts, laying down the laws for the artist to carry out. But

Lessing,

a literary man and a philosopher, once and for all disproved the idea that poetry and the Arts were convertible terms. Lessing was not much interested in the Arts, except poetry, but the fallacious thought of his contemporaries exasperated his active and intensely logical mind into writing the famous "Laocoon." His position was twofold—(1) that the Arts differed in subject and treatment; (2) that the end of Art was pleasure. The artist employed forms and colours in space; the poet articulated sounds in tune. The right objects for painters and sculptors were objects which coexisted side by side, whose impression on the senses could be rendered at one given moment. The poet had to give consecutive impressions—he could employ only a succession of sounds or words to make us realise action. From this Lessing argued that poetry and literature and the plastic and graphic Arts were not synonymous terms; that before subjects were transferred from one to the other they must be mentally recast with a realisation of the limits of the Arts in which they were to be newly expressed. (Professor Blomfield instanced last year's Soane medallion competition wherein the palace of Bacon's "Essay on Building" was set a subject for design. This was wrong in principle, for that which might be legitimate in a prose picture became unintelligible and unworkable when literally translated into architectural design.) It was for its insistence on this point that Lessing's work was so valuable to artists. Lessing took little account of the passionate emotion that was the mainspring of fine work in all the Arts, but, given the impulse, he supplied certain leading principles by which the artist was to observe the limits of his Art. As Aristotle had it, the pleasure to be derived from tragedy was that peculiar to tragedy. What was, then,

the peculiar pleasure of the Arts?

The object of Art was a somewhat complex affair. It was

(1) Partly to give pleasure;
(2) Partly the irresistible impulse of the artist to express his emotions;
(3) Partly, in architecture at least, to fulfil certain definite needs and conditions.

Somewhere along the lines of these objects would be the end of Art, but it was material how the object was attained. The pleasure obtained in Art was the pleasure of beauty—of form, colour, light and shade, rhythm and proportion. There was no standard and unalterable form of beauty: rather there was an inexhaustible reserve, to be seen only by the seeing eye, and made visible by the skilful hand. Truth might be at the bottom of a well, but Beauty was everywhere for those who could see it. Still, the existing state of our faculties could not conceive everything as beautiful: we could hardly realise pleasure on the stage of Mr. Wells's imagination. Our conception of beauty with limitations and imperfections, the result of innumerable associations during countless generations, would probably regard certain things as beautiful always, and certain other things as ugly always. The power of selection and rejection was at the root of the matter. Sculpture and painting rested on a convention—we were prepared to accept this as representing the objects purported to be represented—but as they tended to literal realism they approached the destruction of the convention.

Madame Tussaud's figures

were more like the originals than any marble figures; but their appeal found us cold. They were not the result of artistic thought and they had no comparison with reality. The difficulty was to know

when to limit realism.

Coloured sculpture seemed to the lecturer outside the province of that art. Selection was obviously needed in sculpture. One would hardly select it as the art in which to narrate a story. The elaborate carved scenes outside the choirs at Amiens and Chartres might be adduced as instances of melancholy failure: the carving was extraordinarily skilful, but the value as surface ornament in the architectural scheme was considerably less than a piece of good detail work or a rusticated surface.

Architecture was the Cinderella of the Arts, and there was no doubt it stood somewhat apart from the rest. Firstly, it was in no sense imitative: and secondly, the architect did not select his subject—he had to conform to the conditions of the problem of the site and the materials. He was there to produce an organic composition, not details, but a whole in which those details united to give an impression on the emotions. Details were not in themselves of value; they were merely the notes which a composer used. Architecture was not cabinet-making nor goldsmiths' work, but a masculine art, the handling of masses of material. An architect should always have before him the effect of his building as a whole. All his skill and energies, and those of his colleagues, were wasted unless unity of effect was kept in view; and there was another limitation in the fact that during the course of ages certain æsthetic instincts had grown up which were not to be set aside. Architectural forms were old just as were the words of a language. Still, no one asserted that the possibilities of the English language were exhausted, and it was equally so with Architecture. The architect's invention and originality were shown in the use he made of accepted forms. They could not expect the public to understand their art until they had clear ideas themselves about its limits and possibilities.

(Reports of the first three of Mr. Blomfield's Academy lectures were given in our issue for March 6th.)

The buildings of the forthcoming Irish International Exhibition are now practically completed at Dublin. They include the Grand Central Palace, the area of which is 100,000ft., while the area of the Palace of Mechanical Arts is 90,000ft. The Palace of the Fine Arts, as originally constructed, had an area of 30,000ft. but so many will be the exhibits of paintings and sculpture that it has been found necessary to construct two annexes to provide sufficient accommodation. There is also a large concert hall.

Notes and News

Voigtlander's Photo Lenses have scored another success, for they have been awarded the Grand Prix from the Milan Exhibition.

Aberdeen Society of Architects.—At the annual meeting of this Society held last week Mr. John Rust was elected president in succession of Mr. R. G. Wilson.

New Offices for the River Wear Commissioners have been erected at the corner of John Street and St. Thomas Street, Sunderland, on the site of the old general post-office. The building was formally opened on Wednesday last. Messrs. Henderson & Hall, of Sunderland, were the architects, their design having been accepted in local competition in 1904. The contractor was Mr. J. W. White, of Sunderland.

Cannon Street Fire Station.—In connection with this new City fire station, illustrated in our issue for last week, we are asked to state that the St. Pancras Ironwork Company carried out the paving and gutters in stalls, and part of the appliance room; they also supplied the stable and harness room fittings. The firm have done similar work at numerous other London fire stations.

Modern Plasterwork.—In his paper before last week's meeting of the Leeds and Yorkshire Architectural Society, Mr. G. P. Bankart said the method of constructing our modern plaster decoration by casting with fibre and wood was a convenience, but whether the process itself was right or wrong was another matter. Much of our modern construction called for it, and it had come to stay, at least for a time. Unlike the plasterwork of the early centuries, which was a mere coating, our process was a casing. He claimed for plaster at least that respect and technical liberty which were due from the artist to any other material or medium of expression, whether the surface of operation were large or small.

The Architectural Treatment of Metalwork

A lecture on this subject was given by Mr. C. F. Innocent, A.R.I.B.A., before last week's meeting of the Sheffield Society of Architects and Surveyors. After dealing with the early use of iron and lead, Mr. Innocent said that a great impetus was given to the designing of wrought ironwork by the arrival in this country of a great French smith, Jean Tijou, in 1670, who later did work at Chatsworth. The earliest use of cast-iron, architecturally, in the district appeared to be in fire-dogs; towards the middle of the eighteenth century the old open fire-places were superseded by cast-iron stoves, and great numbers of these still exist in Sheffield; they are excellent examples of design appropriate to the material, and some of them appear to be by the celebrated brothers Adam. Passing to lead, the lecturer alluded to the beautiful silvery appearance of old lead, which was due to its not having been de-silverized, as was now done. There was really nothing new under the sun, for the Romans used also to de-silverize the lead which they obtained in Derbyshire. Old lead was cast, not milled as modern lead, and the old plumbers took advantage of this to leave their names for the information of posterity, as might be seen, for instance, upon the roofs of Sheffield Parish Church,

Our Plates

Infants' School, Alfreton.

This school is being erected at Alfreton for the Derbyshire Education Committee. The idea that finality may not have been reached in the planning of public elementary schools suggested itself to the architect, Mr. Percy B. Houfton, of Chesterfield, on reading Mr. Felix Clay's instructive history of the evolution of the modern school plan. In this instance an attempt has been made to secure (1) available sunshine to all the classrooms during some part of the school day; (2) direct cross-ventilation; (3) supplementary lighting on the right-hand side of the scholars; (4) facilities for supervision from the central hall. The materials are red tiles and cream-coloured rough-cast, with Leicestershire brick base. Internally the walls are lined to a height of 4ft. with salt-glazed bricks, and plastered above. It was proposed to heat the rooms by warm-air grates, but it is now intended to provide a low-pressure hot-water system. A larger teachers' room is being added at the back, and the spaces marked "teachers' room" and "store" are omitted. This allows the south wall of the central hall to have French windows opening to the floor for summer ventilation. The work is being executed by Messrs. Maule & Co., of Nottingham, and the original contract works out at £8 6s. per head. The amendments since made will cause an addition of about £1 per head to this sum.

Nurses' Home, Wolverhampton Hospital.

Particulars of the designs illustrated are given in the criticism of this competition on p. 133.

Obituary.

Mr. L. E. G. Collins, A.R.I.B.A., of London, E.C., died recently, aged 37.

Mr. George Watson, architect and surveyor, of Penrith, died recently at the age of 83. He was a keen archæologist, and wrote much on Cumberland and Westmorland antiquarian and historical questions.

Mr. William Sapcote, head of one of the best known building firms in Birmingham and the Midlands, died on Monday, March 11th, in his 66th year. He had been in ill-health for some time. For about 30 years the deceased took an active part in the affairs of the Birmingham Master-Builders' Association, of which he was several times president. He was well-known throughout the United Kingdom as a builder, and in 1900 he became president of the Association of Master-Builders of Great Britain and Ireland. He had also filled the position of president of the Midland Centre of the National Federation of Master Builders. Among the buildings erected by Mr. Sapcote's firm were the Municipal Technical Schools in Suffolk Street; the Girls' High School, New Street; the Latimer Memorial Church, Handsworth New Road; St. John's Church, Sparkhill; the electric power station, Sumner Lane, &c.; whilst the firm recently secured the contract for the new telephone exchange in Hill Street, work on which has already been commenced.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans	per qr.	1	11	0	1	14	0
Clover, best...	per load	4	7	0	4	17	6
Hay, good	do.	4	0	0	4	5	0
Sainfoin mixture	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	109	0	0	109	10	0
Do. Strong sheets ...	do.	126	0	0	126	10	0
Lead, soft foreign... ...	do.	19	15	0	19	17	6
Do. English	do.	20	2	6	20	5	0
Do. pipes...	do.	23	7	6	23	10	0
Do. sheets	do.	22	15	0	22	17	6
Galvanised Corrugated sheets	do.	13	15	0	14	0	0
Spelter G. M.	do.	26	5	0	26	10	0
Angles, Scotland	do	7	5	0	7	7	6
Bars, do.	do.	7	17	6	8	0	0
Marked bars, Staffs. ...	do.	9	0	0	9	2	6
Common bars, do. ...	do.	7	5	0	7	10	0
Angles, M'boro.	do.	7	2	6	7	5	0
Joists do.	do.	7	0	0	7	2	6
Angles, Midlands	do.	7	0	0	7	2	6
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	7	6	7	10	0
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	191	15	0	192	0	0
Do. English ingots ...	do.	194	0	0	194	10	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

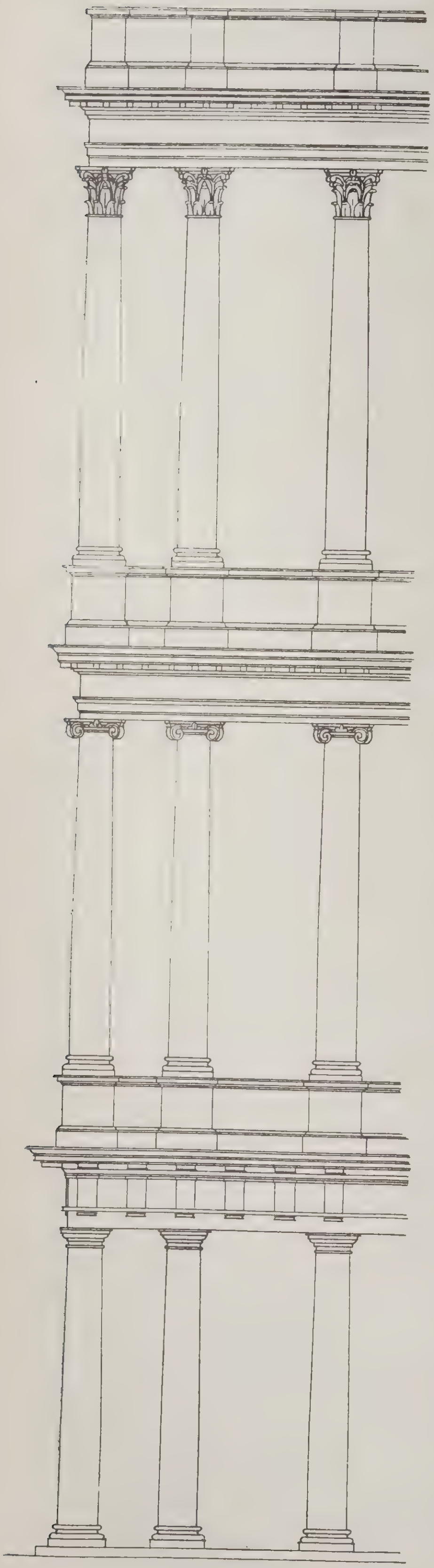
Soft Woods.

		£	s.	d.	£	s.	d.
Fir, Dantzic and Memel	per load	3	10	0	5	0	0
Pine, Quebec, Yellow ...	do.	3	12	6	6	5	0
Do. Pitch, American ...	do.	4	7	6	5	0	0
Laths, log, Dantzic	per cu. fath.	4	0	0	6	0	0
Deals, Archangel, White, 2nd, 3×9	per std.	9	15	0	—		
Do. Altappen & Granvik, Yellow, 1st, 2½×7	do.	9	5	0	—		
Do. Blankaholm, Yellow, 1st, 4×9	do.	10	0	0	—		
Do. do. do. do. 2½×7	do.	9	10	0	—		
Do. Kemi, Yellow, 1st & 2nd, 4×7	do.	10	0	0	—		
Do. Kovda, Yellow, 3rd, 3×8	do.	10	0	0	10	5	0
Do. Mesane, White, 1st, 3×9	do.	11	15	0	—		
Do. Montreal, Spruce, 3rd, 3×9	do.	9	5	0	9	10	0
Do. Nederkalix, Yellow, 2nd, 4×9	do.	8	15	0	9	0	0
Do. Onega, Yellow, 3rd, 3×8	do.	11	0	0	—		
Do. do. do. do. 3×7	do.	11	0	0	—		
Do. Quebec, Spruce, 2nd, 3×7	do.	8	15	0	9	0	0
Do. do. do. unsorted, 3×9	do.	9	5	0	—		
Do. St. Petersburg, Yellow, 1st, 2×9	do.	10	0	0	10	5	0
Do. do. do. 3rd, 3×8	do.	8	15	0	9	0	0
Do. do. do. White, 1st & 2nd, 2½×7	do.	9	5	0	—		
Do. do. do. 3rd, 3×9	do.	9	5	0	—		
Do. do. do. do. 2½×7	do.	8	10	0	—		
Do. Sandviken, Yellow, 4th, 3×9	do.	9	15	0	10	0	0
Do. Skelleftea, Yellow, 1st, 3×9	do.	11	5	0	—		
Do. do. do. 2nd, 3×3	do.	7	5	0	—		
Do. Storfors, Yellow, 2nd, 3×7	do.	9	10	0	—		
Do. do. do. do. 3×5½	do.	9	0	0	—		
Do. do. do. do. 3×4½	do.	8	15	0	—		
Do. Soderhamn, Yellow, 5th, 3×9	do.	10	0	0	—		
Do. Umba, Yellow, 3rd, 3×9	do.	11	0	0	—		
Battens, Arendal, Yellow, unsorted, 2×5	do.	7	10	0	—		
Do. Gefle, Yellow, 1st & 2nd, 2×4½	do.	8	10	0	—		
Do. Grimstad, Yellow, 1st & 2nd, 2×5	do.	7	10	0	7	15	0
Do. do. White, 1st & 2nd, 2×5	do.	7	5	0	—		
Do. Hudikswall, Yellow, 5th, 2×9	do.	10	0	0	—		
Do. Lulea, Yellow, 2nd, 2×8	do.	9	15	0	—		
Do. Nederkalix, Yellow, 3rd, 2×8	do.	8	5	0	—		
Do. St. Petersburg, White, 1st & 2nd, 2×7	do.	8	15	0	—		
Do. do. do. do. 2×6½	do.	8	5	0	—		
Do. do. Yellow, 3rd, 2½×6½	do.	7	15	0	—		
Do. do. do. do. 2×5	do.	7	15	0	—		
Do. Skelleftea, Yellow, 2nd, 2½×6½	do.	8	10	0	—		
Do. Wifstawarf, Yellow, unsorted, 2×5	do.	9	10	0	—		
Flooring Boards, Fredriksstad, Yellow, 3rd, 1×5	do.	0	8	9	—		
Do. do. do., unsorted, 1×8	do.	0	9	6	—		
Do. Gefle, White, unsorted, 1¼×7	do.	0	11	6	—		
Do. Skonvik, Yellow, 1st, 1¼×6	do.	0	14	0	—		
Do. do. do. do. 1×6	do.	0	12	0	—		

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Seventh Series.)

CLASS A (ARCHITECTURE).



A 19

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c. particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

10. Any violation of these rules will entail disqualification.

11. The Editor's decision on every matter will be final.

(*For Coupons see page vi.*)

Copies of "THE BUILDERS' JOURNAL" *in which the first, second, third, fourth, fifth and sixth series of pictures appeared can now be obtained from the Publisher. The dates of the issues are February 6th, February 13th, February 20th, February 27th, March 6th and March 13th respectively.*

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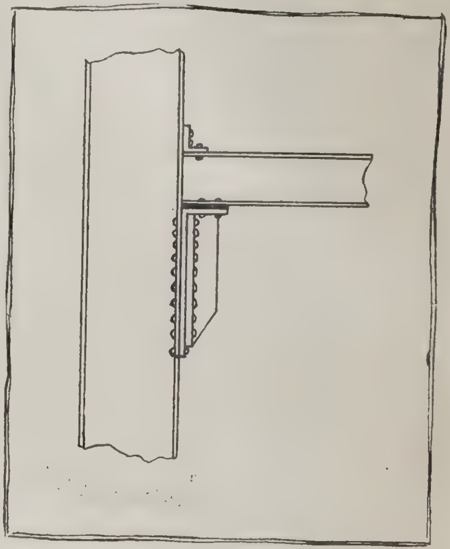

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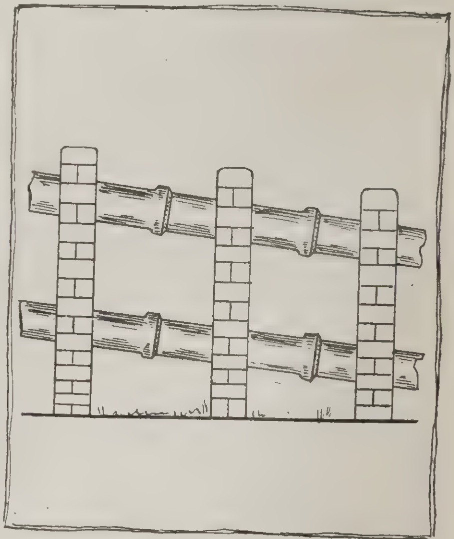

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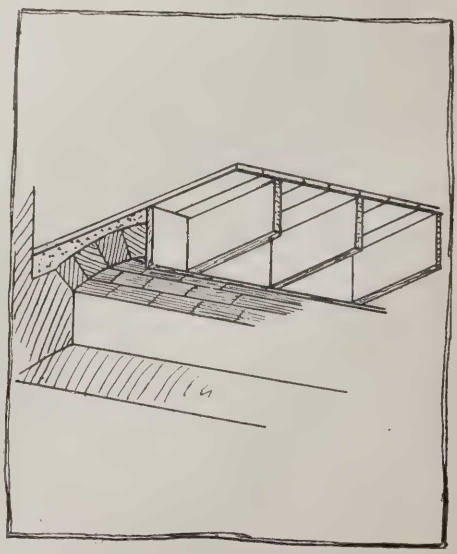

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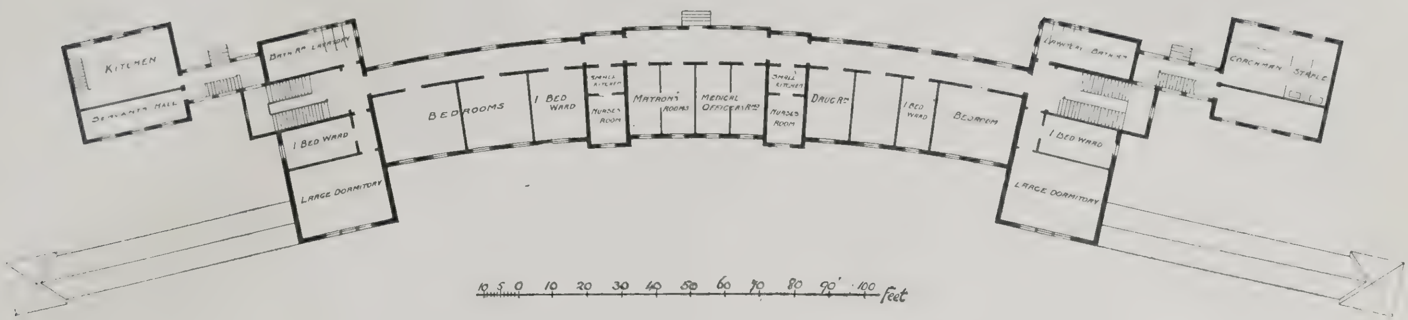
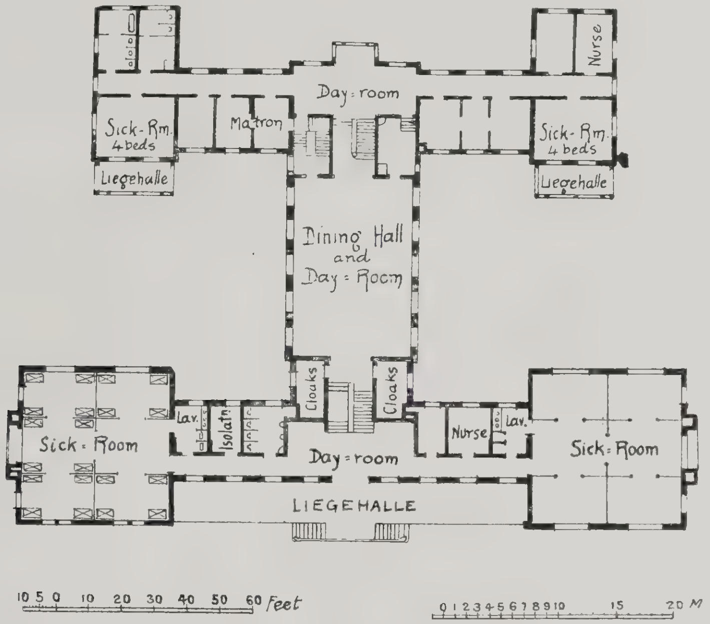
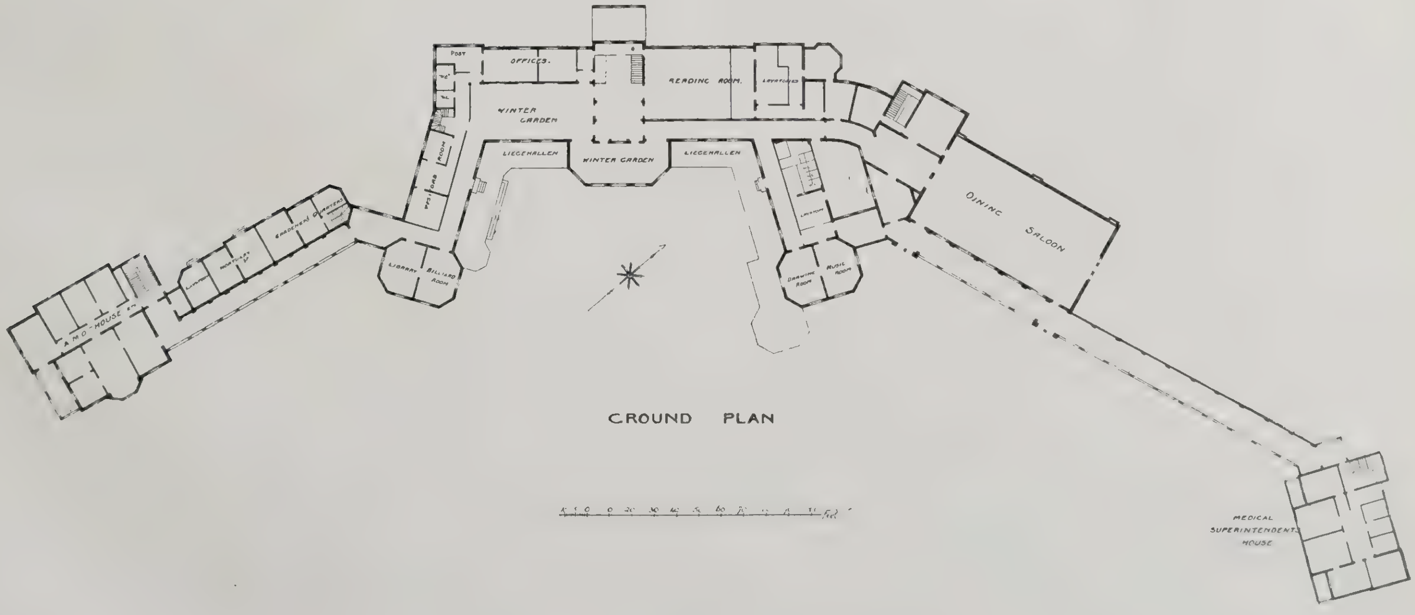
Wednesday, March 27th, 1907.



SANATORIUM, RUPPERTSHAIN, NEAR KONIGSTEIN, GERMANY.



EDMUNDSTHAL SANATORIUM, HAMBURG.
M. HALLER AND H. GEISSLER, ARCHITECTS.



SANATORIUM, FALKENSTEIN, NEAR FRANKFORT.

(Illustrations accompanying Mr. Edwin T. Hall's paper on "Sanatoria for Consumptives.")

Supplement to
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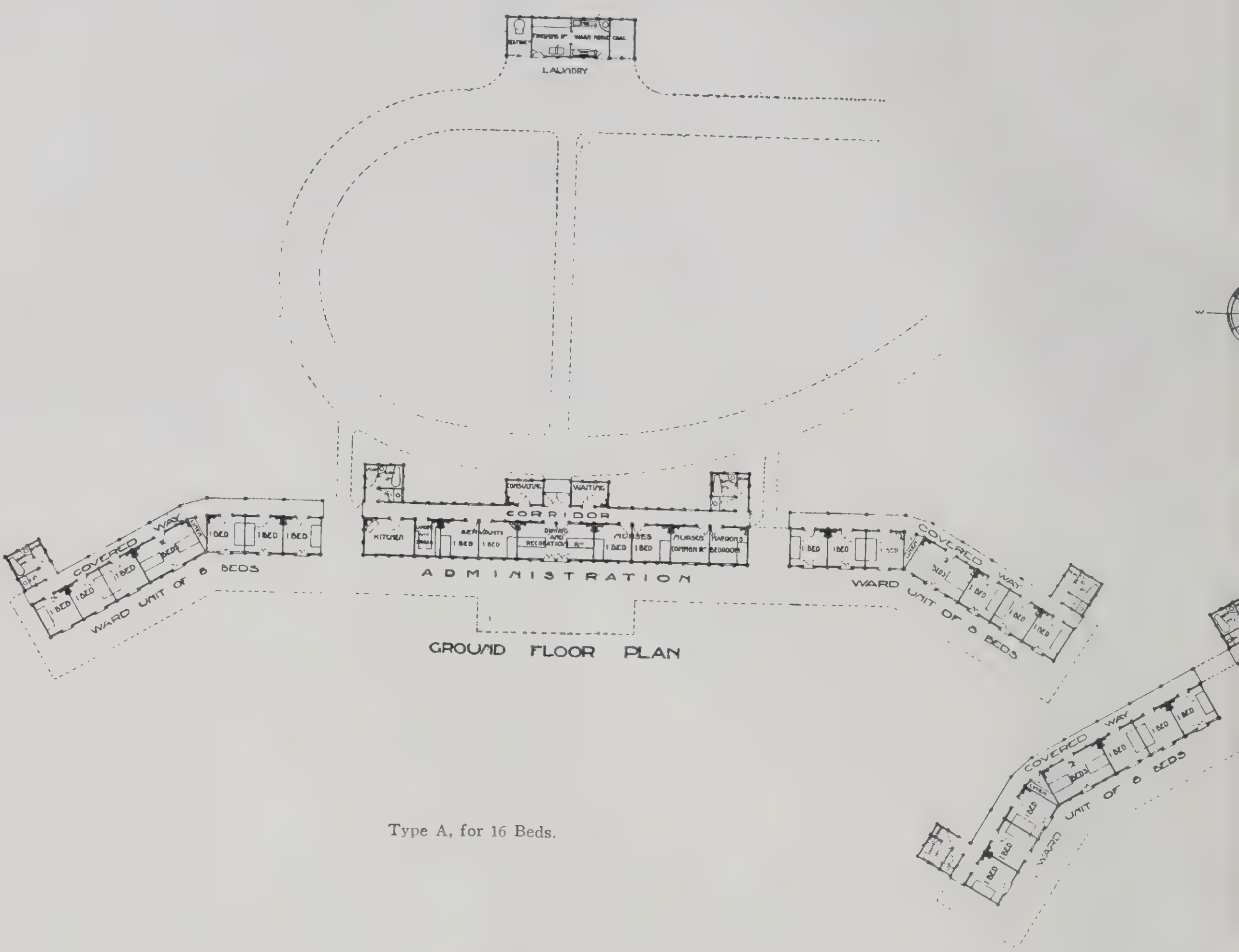

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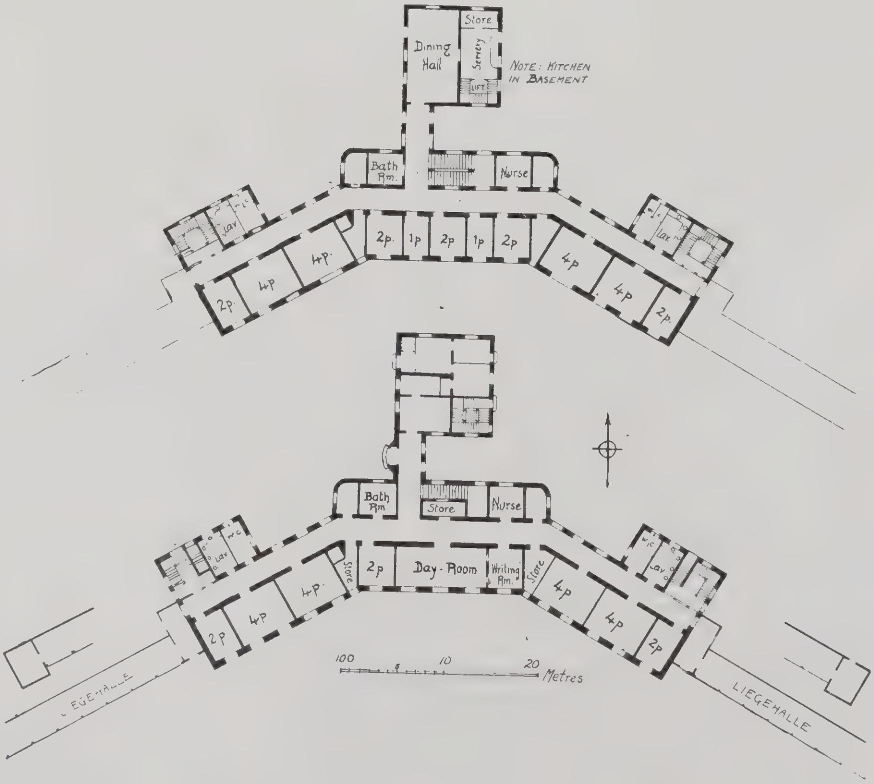

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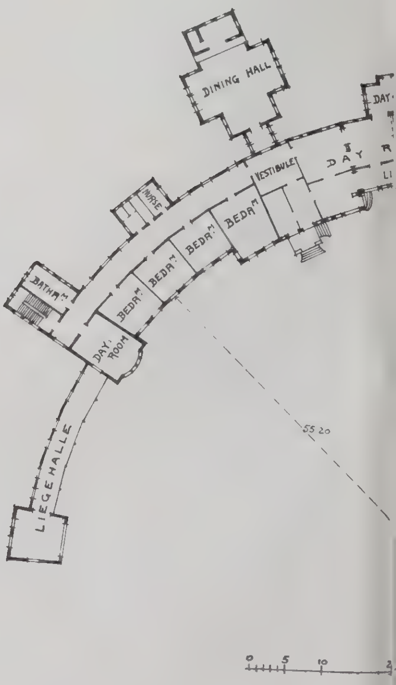

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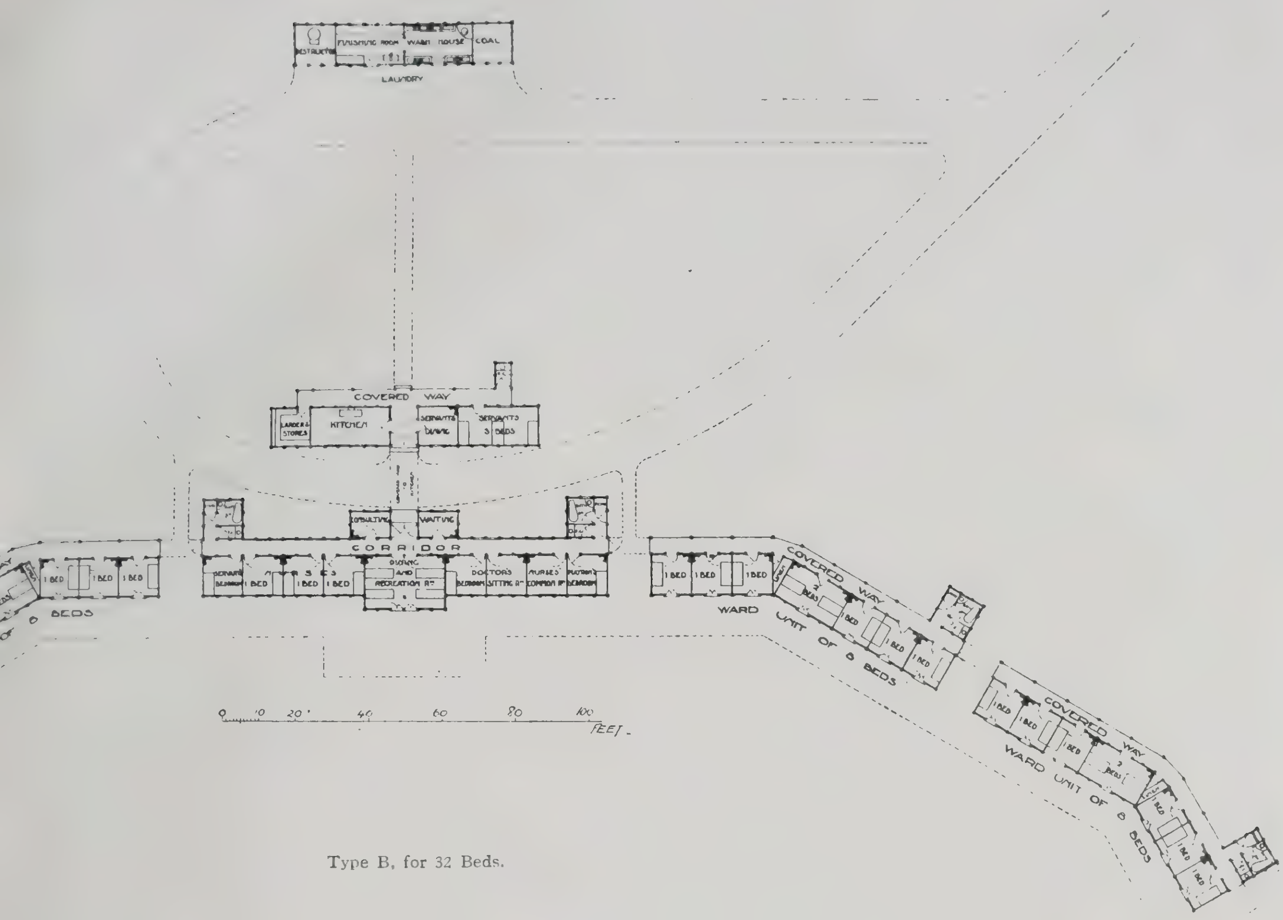

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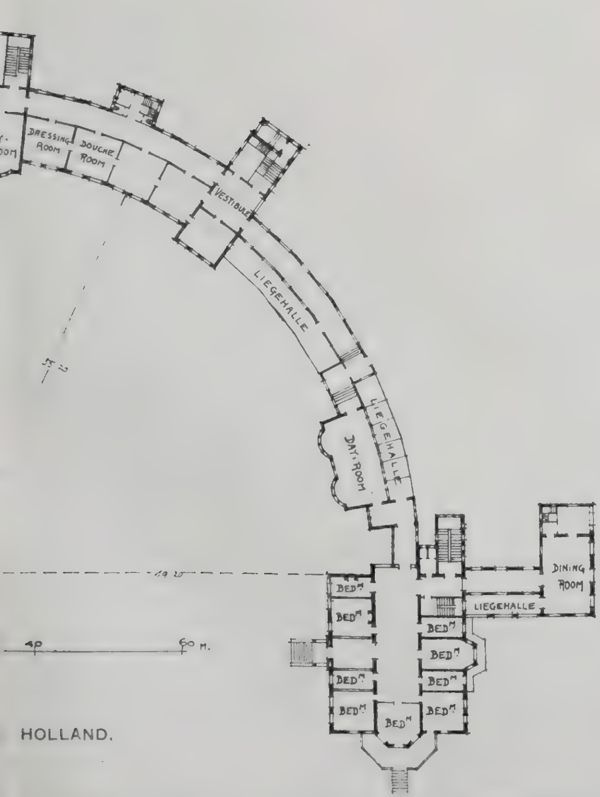

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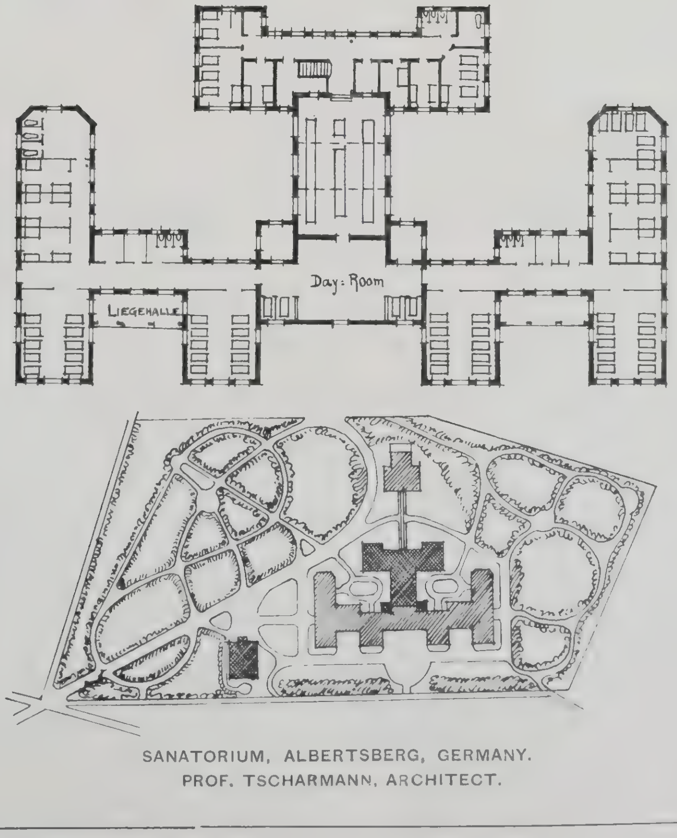

SANATORIUM, ALBERTSBERG, GERMANY.
PROF. TSCHARMANN, ARCHITECT.

n "*Sanatoria for Consumptives.*")

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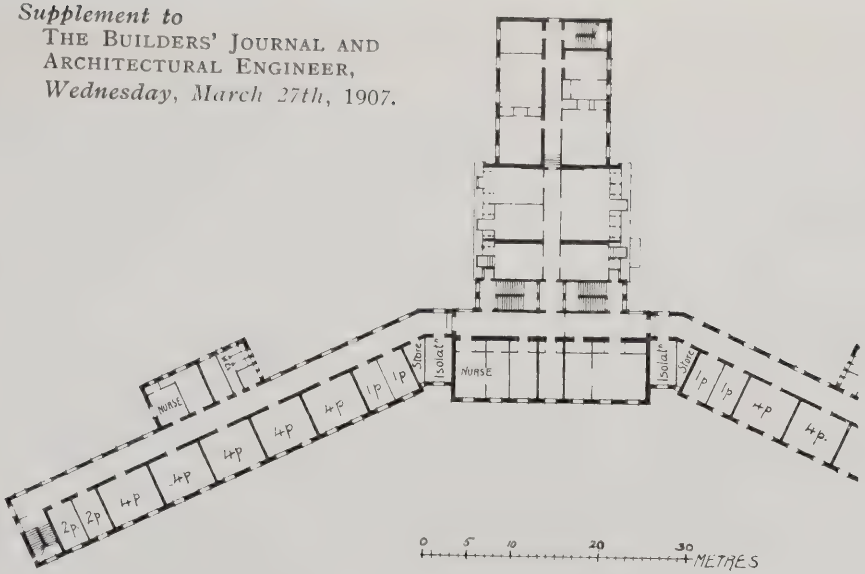
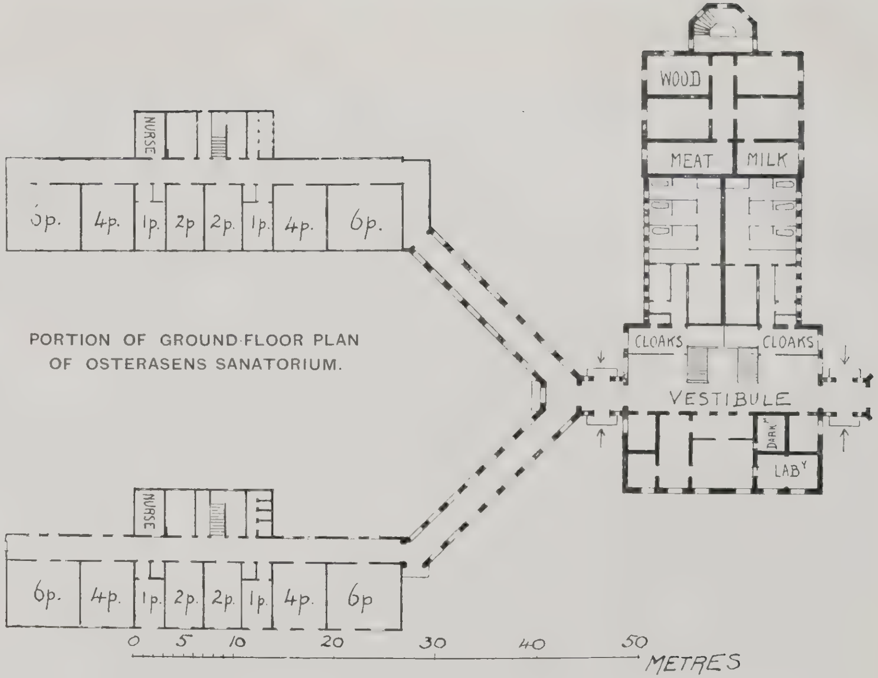
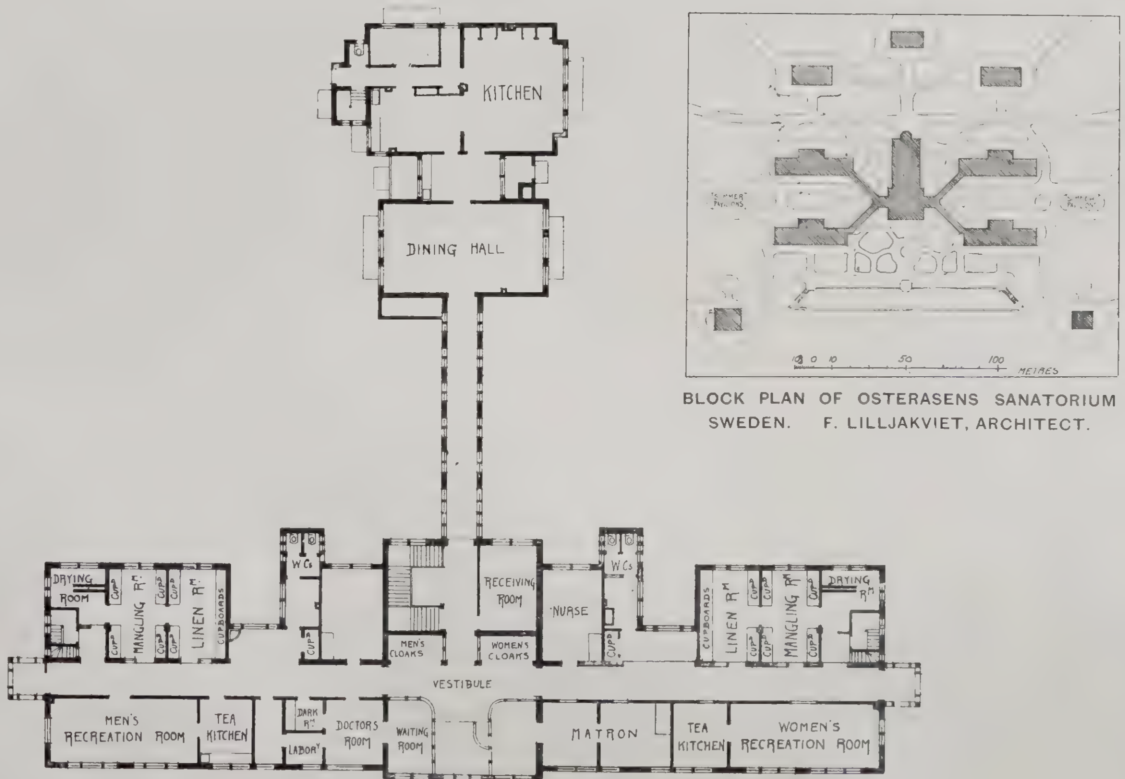


FIRST-FLOOR PLAN OF SANATORIUM, HALAHULTS KRONOPARK, SWEDEN.
A. B. KUMLIEN, ARCHITECT.

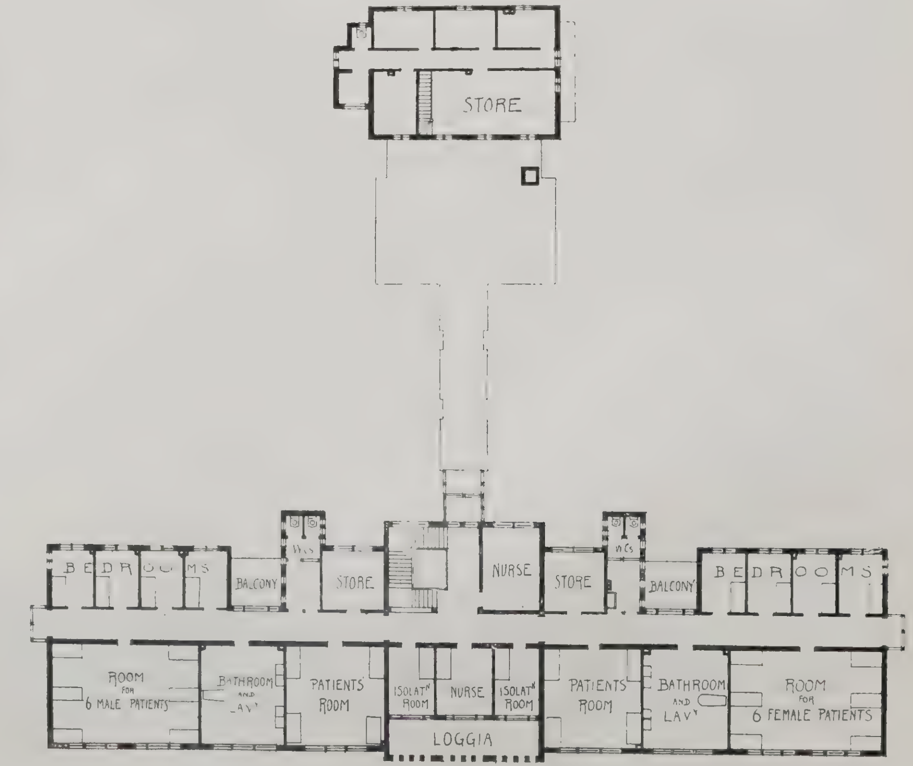


PORTION OF GROUND-FLOOR PLAN
OF OSTERASENS SANATORIUM.



BLOCK PLAN OF OSTERASENS SANATORIUM
SWEDEN. F. LILLJAKVIET, ARCHITECT.

Ground-Floor Plan.



First-Floor Plan.

SANATORIUM HOOG LAREN, FOR AMSTERDAM. ED. CUYPERS, ARCHITECT.
(Illustrations accompanying Mr. Edwin T. Hall's paper on "Sanatoria for Consumptives.")

March 27, 1907. Volume 25, No. 633

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AND ARCHITECTURAL ENGINEER.

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The Fatal Facility. IT is a common failing to leave things until the last moment, and though the Turk's motto, "Never do to-day what can be done to-morrow," is not true of a strenuous race like our own, we share that fatal facility for not doing things when we have the time to do them. This observation, trite enough, is not made as prefatory to an idle homily, but has particular reference to two matters of current interest, namely, sending-in day at the Academy, and the opening of the Building Trades' Exhibition. To-morrow is the last day for sending in architectural drawings for the Academy: that announcement has been made known for weeks past, and we have appealed to architects to let us have their drawings without delay; as in former years, however, we have again experienced a huge rush at the last moment. The time is now practically gone, but we would make a final appeal to the late ones to let us have their drawings at once. With regard to the Building Trades' Exhibition, this also has a "last hour" for intending exhibitors. It is hardly necessary to call the attention of readers to the unfortunate custom which seems to prevail in connection with exhibitions of this kind. More often than not, the stalls on the opening day are found to be only half complete. Either the exhibits are not to hand, or, if they are, have not been unpacked: with the consequence that right up to the last minute before the opening, and immediately following the temporary lull enforced during the official ceremony, there is a hammering and a bustling, a swish of sweeping up and hasty overhauling, that not only spoils the exhibition for the time being, but must mean a comparative loss to the exhibitors who are thus behindhand, because early visitors do not see the goods. Stall holders at the Building Trades' Exhibition have, in their undertaking, agreed to have their stands complete by 10 p.m. on April 5th—that is, the night before the opening day—and we sincerely trust that this condition will be complied with. The matter is one which has been allowed to become a bad habit, especially so with great international exhibitions, which are notoriously behindhand. We hope, therefore, that all connected with the forthcoming exhibition at Olympia will do their utmost to get the exhibits completed for the opening day. As already announced in our columns, we shall give in our next issue a guide to the chief exhibits, and in the following issues we shall deal fully with the exhibition. We stated in our last issue that, by an arrangement which we have with the promoters, readers of THE BUILDERS' JOURNAL will be entitled to a free pass to the exhibition, and we are much gratified at the number of applications for such passes which we have received during the past week. The Prince of Wales has expressed his intention of visiting the exhibition, and this will give additional interest to it. With every available space occupied, it will start well, and we have no doubt that the thousands who will visit the exhibition will assure its complete success.

New, True, or Neither

I am informed that in the offices of some architects the principal himself is only retained for the purpose of receiving the honour of knighthood, should occasion arise.

* * *

Architects who grumble against competitions should go to Brussels and work for the civic authorities. Maquet, the well-known Belgian architect, is suing the city of Brussels for 225,000fr. for plans and expenses. He won a competition in 1876 against 162 rivals for the famous Mont des Arts, and three subsequent competitions in 1882, 1887, and 1894, for alterations to the building. 1907 finds him still competing for the judge's favour. Architects in cathedral competitions please note.

* * *

The architect of St. Etheldreda's Church, Fulham, has been making a personal protest against a brother architect and his assistant who went into the church the other day and, without asking anybody's permission, proceeded to measure up the building—presumably, it is suggested, for a new church in contemplation. This is really a monstrous proceeding—I mean the measuring up. Why should this architect and his assistant have wanted to do it. Evidently they must be of grossly depraved taste. They might at least have had the decency to consult some reproduction of the design quietly in their offices, like other respectable members of the profession, who would be indignant at any suggestion of cribbing.

* * *

The question of "cribbing," by the way, raises quite pathetic memories. After all, it would be a bad day when the building papers stopped publication, and architects were left to their own devices. *A priori*, of course, that might be a delightful era, but the talented author of "Gothic Art in England" would have to issue a manual for his benighted brethren, so that they might take to bricklaying and stone-cutting right away.

THE LOOKER-ON.

NOTICE.—*Owing to the Easter Holidays* THE BUILDERS' JOURNAL *for April 3rd will go to press to-morrow, March 28th. No advertisements for that issue will be accepted later than 5 p.m. on that day.*

THE ARCHITECTURAL ASSOCIATION.

Mr. Edwin T. Hall on "Sanatoria."

A meeting of the Architectural Association was held on Friday evening at 18, Tufton Street, Westminster, the chair being occupied by Mr. A. Needham Wilson.

Messrs. R. F. Chisholm, W. Charles Steljes and H. M. Pett were elected members of the Association, and the reinstatement of Mr. B. A. Elphicke was announced. The chairman read the House List for 1907-8, with Mr. Walter Cave as president, Mr. Arthur Keen and Mr. Henry Tanner, jr., as vice-presidents, eighteen names for council (nine to be elected), Mr. Edwin Gunn as hon. librarian, Mr. Baxter Greig as editor of "A. A. Notes," and Messrs. C. Wontner Smith and Maurice E. Webb as hon. secretaries.

Mr. Edwin T. Hall, V.-P.R.I.B.A., then read a paper on "Sanatoria for Consumptives." The paper was illustrated by a number of plans of sanatoria on the Continent and in England, of which the illustrations given in this issue are a representative selection.

Mr. Hall pointed out that Germany had given first attention to the provision of such buildings, and, as a result, hospitals and sanatoria were to be found all over the German Empire. He showed on the screen a map of these.

Before proceeding to deal in detail with the plans illustrated, Mr. Hall made some preliminary remarks in regard to sites and types of buildings. In practically all the cases which he illustrated, the sites selected had open prospects (broadly speaking towards the south), with shelter from the north, and with extensive areas for exercise: in other words, dry sites at bracing altitudes, aspects with the maximum of sunlight for patients' rooms, protection from chilling winds and sleet, and open-air living, were regarded as essentials for the reinvigoration of the invalid, while broad prospects were mentally stimulating, widening the interests in life and inculcating hope in the future. Pine woods as a screen were much appreciated for their exhilarating resinous aroma, and the sandy soil on which they thrived was considered the best on which a sanatorium could be situated.

Evolution of Types.

The earliest sanatoria were ordinary houses. Given the essential requisites of location, all that was sought was a place in which patients could sleep: disciplinary treatment was relied upon for the rest. A reputation for the cure being once established, buildings became larger as demands for accommodation increased, and many houses grew into hotels. Of such a type is Falkenstein in the Taunus Mountains, near Frankfurt, and Hohenhonef, near Cologne: both have in parts a central corridor, with rooms on each side, common to most hotels.

Gradually the development of the sanatorium has led to a type with a corridor on the north and rooms on one side only.

Another branch of development has been the aggregation of small houses, first by the natural process of the acquisition of adjacent buildings, and later by a deliberate scheme of constructing small houses on the village principle, with central administrative buildings. The natural aggregation may be seen in Dr. Walther's colony at Nordrach, in the Black Forest; the artificial village may be seen at Montigny, in the North of France; and there are several in America, all for paying patients.

A third type is the large hospital with wide verandahs on the south side of wards, where the open-air treatment is practiced by placing couches on the verandahs, and on these the patients are reclined for 8 or 10 hours a day. Harlaching, near Munich, may be cited as an example. Another ramification of the same idea, even with buildings specially erected as sanatoria, has been the construction of what in Germany are called **liegehallen,** or reclining halls. These are generally one but sometimes two-storeyed verandahs enclosed on three sides, and open to the south; sometimes attached to, but often entirely separated from the building proper. They are very general in Germany. Mr. Hall thought, however, that this arose to a great extent from the design of the sanatoria themselves. Most of these buildings on the Continent are of three or more storeys in height, as though the military idea of a barrack were the motive of the design adopted, and as experience taught the managers that the patient must come out of his nightly domicile, and could not be going constantly up and down stairs, provision had to be, and was, made for his resting during the day in shelters in the open air.

Hospitals are necessary for any advanced stages of consumption, but sanatoria are more particularly intended for, and are more successful with, early-stage cases of pulmonary tuberculosis. While, therefore, a hospital of three or four storeys might be justified where sites were limited or concentration was considered imperative, sanatoria were better of one or two storeys with verandahs on the ground floor, and with such a type Mr. Hall considered liegehallen to be unnecessary.

"I believe, too, that the medical view is gradually coming to regard the treatment of keeping these patients lying down for many hours at a time as prejudicial to any permanent recovery and conducive to idle habits, and is in favour of regular and regulated exercise and employment, as in every way—physically and morally—better for the patient, and as educating him to become a more useful member of the community. The results obtained on these lines by Dr. Paterson in the Brompton Hospital Sanatorium at Frimley are most satisfactory, and should exercise an influence on treatment elsewhere."

From the sanitary building point of view, Mr. Hall said **the long central corridor** with rooms on both sides was not to be commended for patients, and even with one corridor sanitarians recommended that there should be ample windows in the outer wall of the corridor, with corresponding openings in the walls of the rooms, so that air might blow right through.

Merits of Buildings of One and Two Storeys.

Of the relative merits of one and two-storeyed buildings this much may be said: the one-storey is the easier and better for patients; the two-storeyed, in a large institution, gives better concentration for the staff. The former in a permanent building is the more expensive when foundations, roofs, and sanitary apparatus are taken into account.

Cottage and Chalet Types.

There are many advocates of the cottage type of sanatoria as tending to greater classification, but that is an argument only of weight where other than first-stage cases are dealt with. Of course the cottage has its advantages for paying patients, because greater privacy can thus be secured.

Much is heard, too, of the châlet type, or wood hut for a single patient, and its trifling cost as compared with a permanent sanatorium, but the two cannot be fairly compared. It would be as reasonable to compare the cost of a soldier's camp of tents or huts with that of a depôt barrack—the one is temporary, the other permanent.

The wood hut is primitive, and although medical skill may in any given individual case produce as good results in the one institution as in the other, the essential difference remains so far as buildings are concerned.

Essential Details.

Two essential details in design are (1) that all windows or other openings shall be carried up to the ceiling, so that all parts of the rooms and corridors may be scoured with fresh air; (2) sanitary apparatus should be external to the building.

Mr. Hall considered that, with such provision, a minimum of 1,000 cub. ft. for a single-bed ward was sufficient, and 9 ft. to 10 ft. ample height in such wards. Single-bed wards should be the rule, but two and three-bed wards were useful. In a hospital where all kinds of cases were taken the case was different, and in these wards of 8 to 20 beds were found.

Floors should not be laid direct on the ground, but should have a ventilated space beneath.

In rooms where windows are practically always open, no ventilating flues are necessary.

Varieties of Plan.

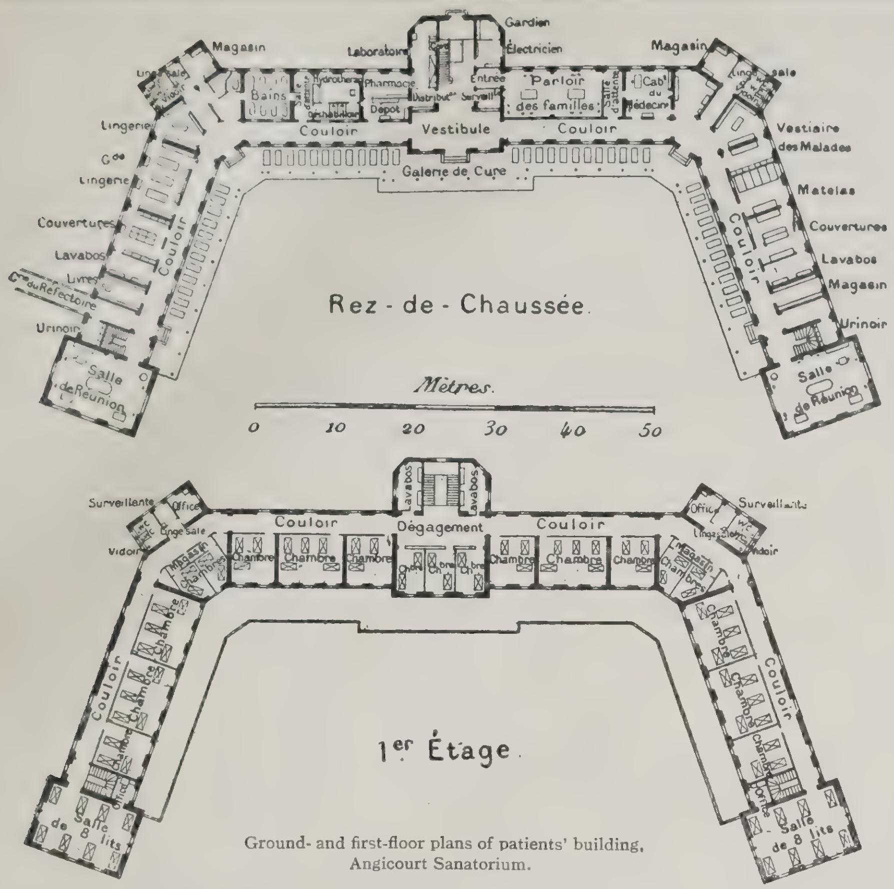
In the designs exhibited, there were great varieties of plan. Some buildings were straight; some T-shaped; some crescents; some like an inverted U, the centre straight, the arms opened out at angles from about 110° to 160°; some cruciform. For moderate-sized sanatoria, say under 50 beds, Mr. Hall said he should give preference to the open U plan. Care should be taken not to put too large a number of patients in one block or pavilion, because of the danger from a large fire. If the building were more than one storey in height, there should be, as far as practicable, no way by which the vitiated air of the lower storey might ascend to the upper one.

Mr. Hall then proceeded to describe the various sanatoria which he showed on the screen.

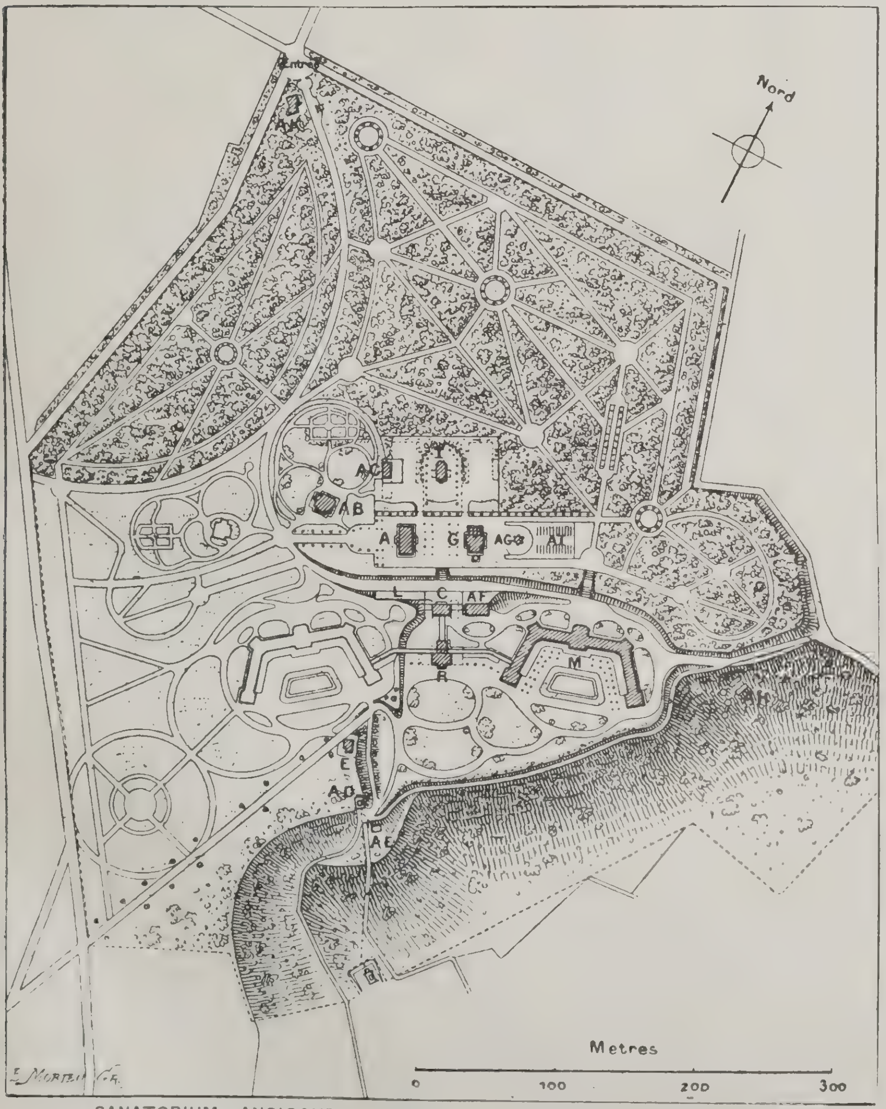
German Sanatoria.

Beelitz, near Berlin.—Designed by Herren Schmieden and Boethke. A large scheme, consisting of 20 main buildings and many smaller ones. The main pavilions are two-storeyed, E-shaped, and patients' rooms mostly face south. Present accommodation, 308 patients.

Belsig, near Berlin.—A long two-storeyed building with axis east and west, the centre being recessed, the whole form-



Ground- and first-floor plans of patients' building, Angicourt Sanatorium.



SANATORIUM, ANGICOURT, FRANCE. M. BALOUET, ARCHITECT.

A, Administrative; G. Wash-house; AG. Reservoir; AI, Drying ground; AB, Doctor's house: AC. Stable and coach-house; I, Mortuary; L. Workshop; C. Kitchen; AF. Engine-house; R. Dining-hall; M. Patients' building (164 beds); E, Staff; AD. Fountain; AE. Water tank; AK. Porter; AH. Septic ta ks.

ing an interesting and picturesque group. Accommodation, 125 patients.

Badenweiler.—Four-storeyed, and on plan an inverted T, the base, with east and west axis, containing the patients' bedrooms, and the perpendicular block containing the public rooms, &c.

Meschede.—Again a four-storeyed building with other rooms in the roof. On plan it is a crescent with southern aspect. Accommodation, 114 men.

Albertsberg.—Designed by Professor Tscharmann, of Dresden. A large building with a main corridor running east and west, with pavilions at right angles, those on the south side forming single wards of 10 beds, each lighted on three sides, with liegehallen between them (see centre plate). Those on the north side face east and west respectively, and contain on one floor six wards of 3 beds each, and one at the north-east of 6 beds. The public rooms are in the centre, the dining-room connecting the main building to another parallel block at the rear. Accommodation, 121 men.

Edmundsthal.—Designed by Herren M. Haller and H. Geissler, of Hamburg. The main building for men (see plan on centre plate) is roughly H-shaped, the front block having two end pavilions, with windows on three sides, for 20 beds each, connected by a corridor having a liegehalle on its south side. A large central dining hall connects this block to a parallel one at the rear, in which are 4-bed wards with their own balconies. There are other pavilions for women and children.

Schreibershaw.—Again a lofty building, the rooms in the centre being in single file, those in the side blocks being in double file with a central corridor.

Melsungen.—Another lofty block, forming a very flat crescent, with centre liegehalle on the upper floor and large dining hall behind.

Falkenstein, near Frankfurt.—Four storeys high. The nucleus of this sanatorium was a large private house, and its kitchens and offices are in the basement. Its plan (shown on centre plate) has the public rooms in the centre, with an east and west axis, and two wings with axis south-south-east and south-south-west. It will be seen that there is a central corridor with some bedrooms facing west, north-west and east-north-east. Accommodation, 120 paying patients of either sex, with 70 single and 25 two-bed rooms.

Ruppertshain, near Königstein.—Three storeys in height, the main building crescent on plan (see centre plate). It contains 112 patients' beds, all facing towards south—90 beds for men, 32 for women. There are 6 six-bed wards, 17 four-bed, and 18 one-bed wards, all in single file south of a well-ventilated corridor. Its annexe has further accommodation.

The Volksheilstatte Krailing, near Planegg, Bavaria.—Designed by Herr Michael Dosch. Accommodation, 120 patients. This sanatorium has a central block with east and west axis and two wings with east-south-east and south-south-west axis. There are 13 single-bed wards, 14 of two beds, 6 of three beds, 2 of four beds, 6 of five beds, and 2 of six beds, but more beds are occasionally used to accommodate the maximum number. Well planned.

Harlaching, near Munich.—Designed by Herr Hartwig Eggers. A large hospital for 212 patients. There are six wards of 20 beds, six of 12, and some with single beds. It is E shaped on plan, with the axis of the main block east and west, the arms north and south. In the main block, the long wards are lighted from north and south, but the south side is shaded by balconies or liegehallen of solid masonry, 12 ft. wide. This hospital is not exclusively for consumption.

It will be noted in most of these German sanatoria that the sanitary arrangements are most imperfect. Frequently, water-closets are in the heart of the building, in some cases three being in one room, lighted and ventilated by only one window, and having a door of access to the main passage. Sinks and lavatories are as badly placed.

Swiss Sanatoria.

There are many sanatoria in Switzerland, but Mr. Hall showed only that of Schatzalke—a long parallelogram of four storeys, with a central corridor from end to end. The principal floor is largely appropriated to the public rooms.

Swedish Sanatoria.

Stockholm.—A large consumption hospital, designed by Mr. Wickman, ultimately to consist of 18 blocks of buildings, containing in all 1,248 beds. There are three principal buildings, containing 384 beds in each, in groups of eight to a ward. All wards are in single file, the corridor behind being wide and well ventilated. There are three staircases, and there is a cloak-room on the ground floor, a very useful accessory. In another building there are 40 beds, in wards of two beds each. Two summer pavilions have 28 beds in each.

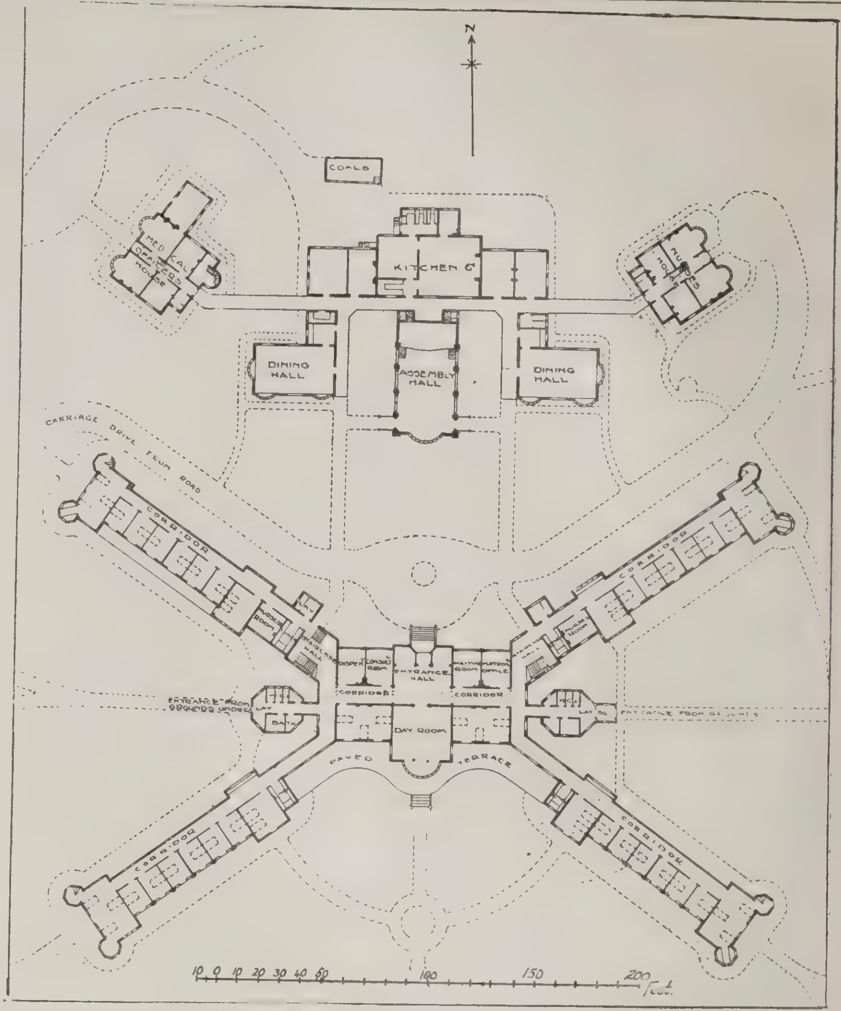
Osterasens.—Designed by Mr. F. Lilljakviet (see centre plate). This sanatorium consists of one group of buildings, containing 104 patients' beds. In the centre is the administration, connected by four bifurcating arms to four parallel pavilions of one storey each, containing two 6-bed, two 4-bed, two 2-bed, and two 1-bed wards. Mr. Hall thought the defect of the plan was that the rear blocks looked on to the back of the front ones.

Halahults Kronopark.—Designed by Mr. A. B. Kumlien (see centre plate). It contains on three floors 102 patients' beds, with a central administration, having its axis north and south, and two wings facing south-east and south-west—one for men, the other for women. There are 18 four-bed wards, the others being for two beds and one bed each. In addition to this main building, there are seven others, including two summer pavilions grouped around the first and largest.

Design for a 50-bed Pavilion (see centre plate).—This has a central block, with axis east and west, and patients' rooms in wings having their axes east-south-east and west-south-west, a type corresponding to that of Planegg, with liegehallen beyond ithe wings. This has eight 4-bed wards, eight 2-bed, and two 1-bed wards.

Dutch Sanatoria.

Oranje-Nassaus Oord.—Designed by Mr. R. Kuipers. A semi-circle on plan (see centre plate), with rooms in single file and liegehallen at intervals, forming a part of the design. It provides accommodation for patients on two storeys, the wards facing south, east and west. There are excellent public rooms, the dining-room having windows on all sides.



Ground-floor plan of Frimley Sanatorium
EDWIN T. HALL, V-P.R.I.B.A., ARCHITECT.

Hoog-Laren.—Designed by Mr. Ed. Cuypers, of Amsterdam. A sanatorium for the city of Amsterdam. The building (of which the ground and first floors are shown on the centre plate) is straight with a central corridor. The ground floor contains the administration and the patients' recreation rooms. The first floor contains eight single-bed wards, two 4-bed wards, two 6-bed wards, and two isolation wards of single beds opening on to a central balcony. The dining saloon and offices are at the rear, and a corridor connects the two blocks.

French Sanatoria.

Angicourt (Oise).—Designed by M. Balouet. This sanatorium is in 320 acres of grounds, and when completed will have 328 beds in two patients' blocks. It will be seen that it differs in plan from any of the others. It is, from a hygienic point of view, admirable in arrangement. Some of the administrative buildings lie on an axis north and south. To the right and left, near the northern end, are two others, while right and left of the southern end are the detached patients' buildings. Each of these has a base with axis east and west, and wings with axes south-south-east and south-south-west. Each block contains 164 beds in four wards of eight beds, twelve of five beds, twelve of three beds, and eighteen of two beds. On the ground floor a galerie de cure, the equivalent of the German liegehallen, extends all around the southern three sides of the enclosing building. A glass corridor connects the building to the dining hall.

Hauteville (Ain).—A sanatorium for the city of Lyons. It is on a site having an altitude of 3,000 ft., and contains 110 beds in three blocks of buildings (two storeys high, with a basement), disposed on an arc of a circle open to the south-west. The wards are of one, two, and three beds each. The baths, laundry, disinfector, kitchens, and dining-rooms are in the basement—a scheme which Mr. Hall considered to be open to grave objection.

Montigny-en-Ostrevent (*Nord*).—Designed by Professor Calmotte, of the Pasteur Institute. It is of the cottage type, consisting of a series of pavilions or houses, each for two families, one of whose members is suffering from tuberculosis. Another block is for contagious cases, and there are laboratories, &c.

English Sanatoria.

In England there are three sanatoria of 100 beds each, which Mr. Hall mentioned in chronological order.

"Heatherside," Frimley, Surrey.—This belongs to and was built (from designs by Mr. Hall) at the cost of the Brompton Consumption Hospital, for the free treatment of the poor. It is two storeyed, with a central block, having its axis east and west, containing the administrative offices, public rooms, and 12 beds for patients requiring special attention, and there are four radial pavilions, containing each 22 patients' beds. Mr. Hall said that so far as he was aware, this is the only sanatorium of such a type. Every ward has a clear and undisturbed view of the open country, all being in single file, facing south, south-south-east, or

south-south-west, with corridors on the northern side, and windows in walls and partitions for through currents of air.

The wards are 48 of one bed, 8 of two beds, and 12 of three beds. The sanitary apparatus is all in detached towers. To the north of the patients' building are grouped the administrative buildings and recreation hall, and it has been sought to give all these the maximum of sunlight and air.

Northwood (Middlesex).—This is not strictly a sanatorium but a country branch of the Mount Vernon Hospital. Like the one at Frimley, it is for the free treatment of the poor. It was the gift of Mr. Rudd, and was designed by Mr. Wheeler. It provides for 114 patients, 57 of each sex, and there are 10 beds in most of the wards, but there are 12 single-bed wards. Its plan of the main building has a small base, having east and west axis, for offices, and two wings two storeys high, east-south-east and west-south-west, with a wide paved terrace on the south. The administration is to the north.

The King's Sanatorium, Midhurst.—The gift of Sir Ernest Cassel, for paying patients. Designed by Mr. H. Percy Adams. This contains 100 single-bed wards in one large building, three storeys in height in the centre, and two storeys in the wings. All the rooms are in single file facing south, south-south-east, and south-south-west, with corridors to the north of them. The dining hall, connected by a corridor, is to the north, and the administration and staff homes are in the west wing of this same block, the kitchen, &c., forming the east wing.

Pinewood Sanatorium, near Wokingham.—Designed by Mr. F. Jones for paying patients. It has a central administrative block and two detached two-storeyed wings, each containing 32 single-bed wards in single file, facing south-south-east and south-south-west. The dining rooms, offices, nurses' and servants' quarters are to the north.

Infirmary Wards.

Mr. Hall showed plans of the consumption wards and provision for open-air treatment on the roofs of four pavilions designed by him as part of the Camberwell Infirmary, where the medical results obtained with consumptive patients are most satisfactory.

Cost.

Mr. Hall said he had not dealt with the cost of the various sanatoria because a comparison between the several European countries was almost impossible, the rates of wages and prices of material differing very largely. A cubic basis of cost was illusory because manifestly rooms of large cube were cheaper per foot than those of smaller dimensions The cost per bed was that usually adopted, and this had varied according to the type of design, the scope of the institution, the locality, &c., but for high-class permanent sanatoria the cost had ranged from £350 to £600 per bed, and even to over £1,000.

It was objected that the cost of all these institutions did not meet the want of sanatoria to be constructed all over the country for the million—in the literal sense—and it had been said that architects had yet to solve the problem of a design that could be carried out for complete institutions of varied size to suit local wants, at a cost that should commend itself to the guardians of the public purse. Huts, on the one hand, were cheap enough, but very temporary, and the maintenance was considerable; they had also special fire risks in wooded districts. At the other extremity was the solid building.

Mr. Hall said he had been giving a great deal of thought to the solving of the problem, and this has eventuated in the designs which he showed (see centre plate). The enclosing material, including that of floors, is noncombustible and impervious to rain and vermin. It is made in dry slabs of standard size, which are practically universal in application for the unit. A sanatorium on these lines, complete with all essential administrative buildings to suit any required number of beds, with drains, fittings to kitchen and laundry, and water storage, could be erected on a suitable and reasonably accessible site at a cost of about £85 to £105 per bed, depending on its size. As examples of what may be done, the plans in this issue show a sanatorium of 16 beds with its appropriate administration to cost about £1,680, and one of 32 beds to cost about £3,170.

"Now it should be said at once that these buildings do not pretend to compete with the large permanent sanatoria illustrated and described. Those have their place. They are the central institutions and places of research. My aim has been different. In June, 1905, a profitable discussion of the whole subject took place in London, and Dr. Heron, in the course of his remarks, said: 'All poor consumptives should be sent into sanatoria for their own sakes, and for the sake of the healthy community. This could not be done if sanatoria were built costing £200 to £800 per bed. A sanatorium well equipped for the service of the poor should not cost more than £80 per bed.' I venture to express a hope that my application of his remarks will meet the want there expressed. The buildings suggested have in them nothing in common with the temporary wood hut or galvanised iron buildings with timber construction and cavity walls and roofs. They have solid thin walls, roofs, and floors, with no cavities. They have smooth internal surfaces, avoiding the expense of plaster or wood covering. These surfaces may be left bare or may be distempered or painted. The drainage is taken to be for soiled water only, which, if no sewers are available, would be taken into cesspools, as at Nordrach, and emptied by closed suction-carts. A water supply is assumed of course to be available, either from public mains or a local pure stream or other source. Fireplaces in all rooms are provided to avoid the great expense of an engineering plant. A gas supply is required for heating bath water by geysers, and gas or oil may be used for lighting. All the joinery required can be prepared in labour centres and carted on to the site ready for immediate erection.

"It will be noted that in all cases the sanatorium is divided into units of eight beds, each unit containing six wards with single beds and one with two beds. With a total of only 16 beds it is assumed that the medical work will be done by a non-resident physician, the patients being in charge of a qualified matron with nurses. With 32 patients, a resident doctor is provided for in addition to the matron, and the nurses and servants are increased. With 48 patients, quarters are provided for two medical men, a matron, and an assistant matron or housekeeper, with a large staff of nurses and servants.

"All the buildings are one storeyed. All patients' rooms face south-south-east or south-south-west; all staff rooms face either south or east and west so that all get ample sunlight All rooms are approached by corridors or covered ways, protected from rain. All patients' rooms have glass verandah shelters on the southern side. The open-air treatment is fully adopted."

Discussion.

A discussion followed the reading of the paper. Dr. Bulstrode said he was preparing a report on this subject for the Local Government Board, and on that account he was not altogether in a position to express himself freely. He very much sympathised, however, with Mr. Hall in his endeavour to provide a scheme of cheap sanatoria for the poor. In this connection he mentioned the sanatorium which was being erected at Benenden in Kent, at a cost, he believed, of about £100 a bed. He pointed out that the reason why there were so many sanatoria in Germany was that workmen there earning less than £100 a year had to insure themselves against invalidity, sickness, and old age, and the insurance companies found it to their advantage to take care of any tuberculous patients in sanatoria, as it was, of course, one of the primary considerations to stamp out the scourge. In this country Dr. Bulstrode pointed out that consumption was not, as popularly supposed, on the increase, but had been dying out for the last fifty years, and, if proper measures were taken, there was reason to believe that in the course of the next thirty years the disease would be as rare as leprosy.

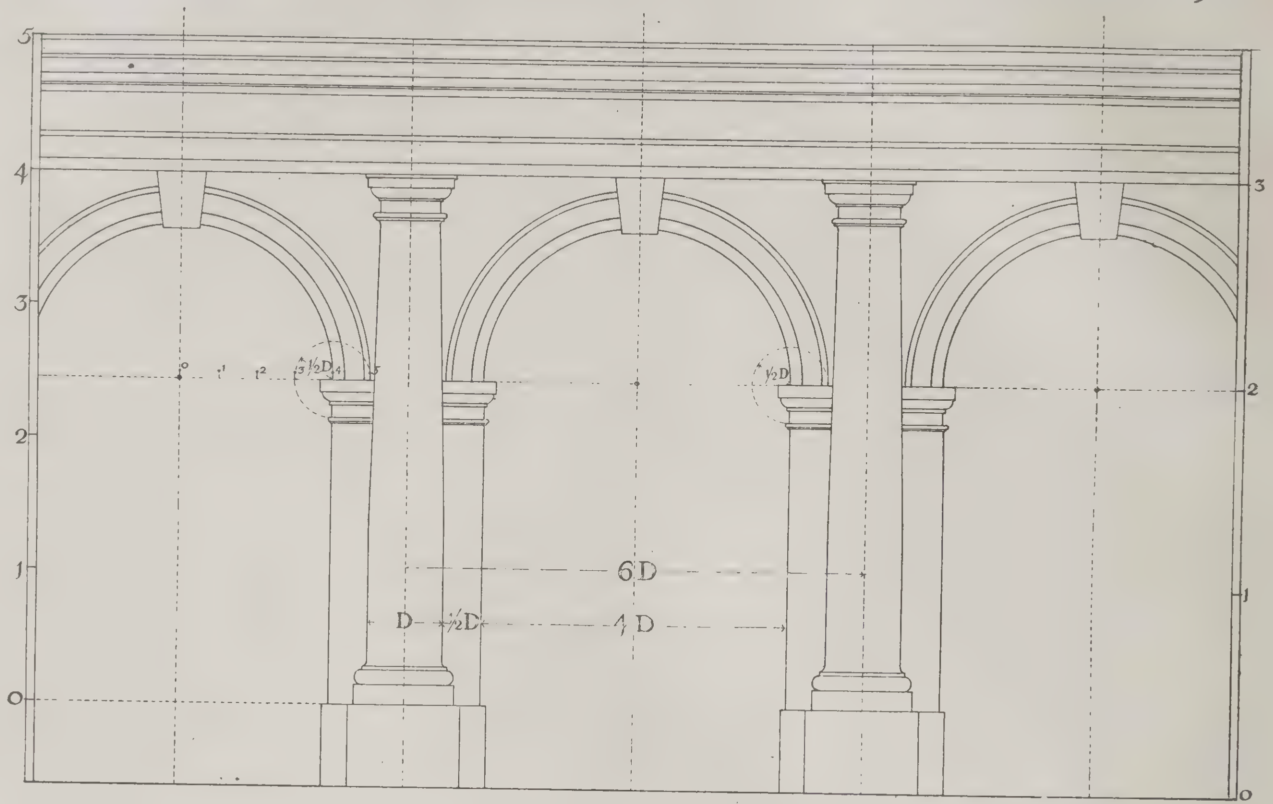
Dr. Lyon, of the Victoria Park Hospital, made some cogent remarks in reference to several sanatoria. The King's Sanatorium at Midhurst, in his opinion, was a failure: although it had the ideal pine trees and the ideal sand, the site was one where dense mists were frequent. There was an initial difficulty in obtaining drinking water, and also the place was very difficult to get at. He thought, however, that too much had been made of this matter of pine woods and sand. Speaking from his own experience, he found that at a chest hospital all the cases of phthisis did better on the balcony than in the wards, and this brought him to emphasise the point that all that was needed was a room to sleep in with just four posts and a roof with shelter from the north and north-east winds. Rooms in this way could be as small as possible. It was waste of money to erect such elaborate buildings as the King's Sanatorium and that at Northwood—the latter, he believed, having cost about £200,000.

Mr. W. A. Forsyth agreed with Dr. Lyon's standpoint. He, too, thought that what we specially wanted was not elaborate buildings, but sheds. The foreign sanatoria which had been described were like nothing else than large hotels, and he, personally, did not think there would be very many more of them. He did not favour the placing of several patients in one ward, his idea being that of one man one room.

Colonel Gerard Clark followed on somewhat the same lines, and, after a few remarks from the chairman, Mr. Hall replied.

- EXAMPLES OF ARCADING -

PLATE 16.



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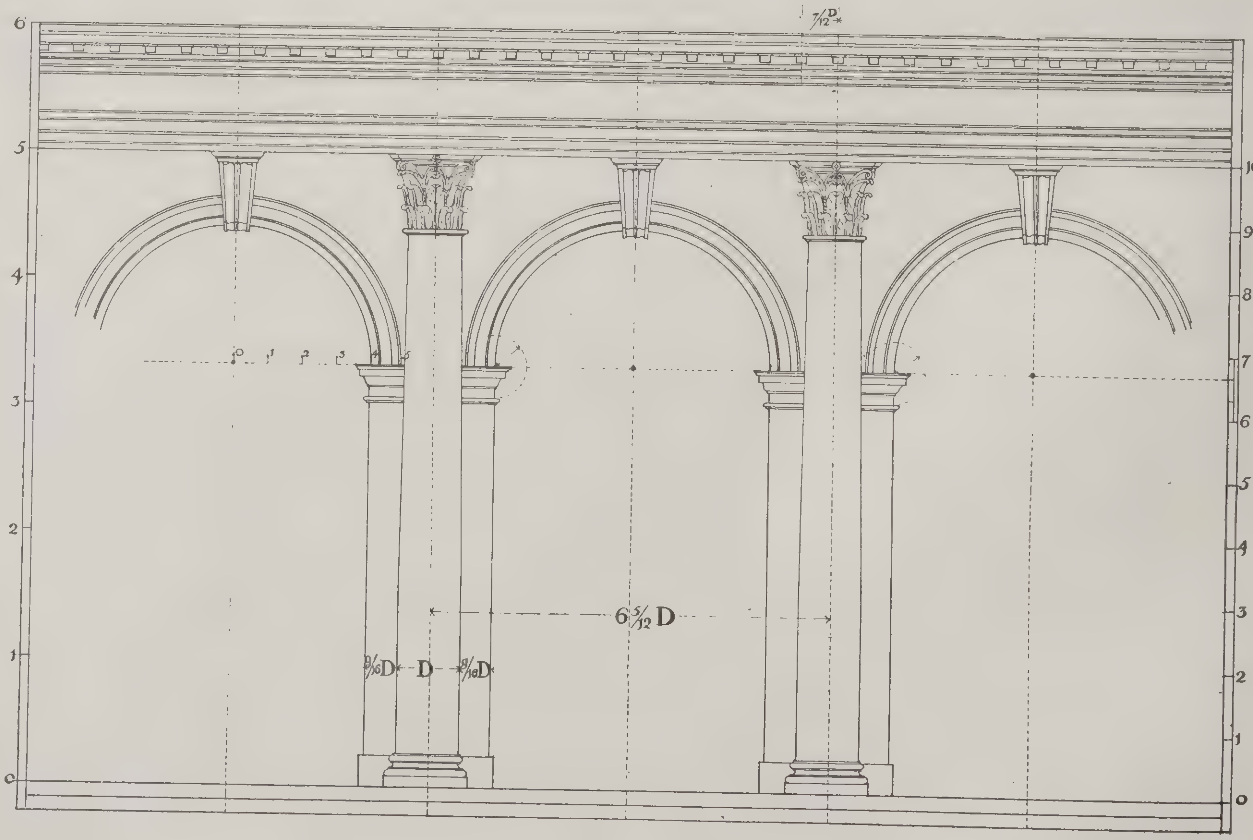


CORINTHIAN.

PRACTICAL NOTES FOR ARCHITECTURAL DRAUGHTSMEN.
BY ALFRED W. S. CROSS, M.A., F.R.I.B.A., AND ALAN E. MUNBY, M.A., A.R.I.B.A.

PRACTICAL NOTES FOR ARCHITECTURAL DRAUGHTSMEN.

The illustration on the preceding page of arcading in the Tuscan and Corinthian Orders is supplementary to a similar drawing of the Ionic and Doric Orders, which was given in our issue for October 24th last, the descriptive letterpress accompanying which should be referred to in connection with the example now given.

Notes on Competitions

Technical Institute, Dundee.

The action of the Dundee Institute of Architecture in refusing to take part in the competition for the plans of the administrative building of the new Technical Institute has produced a rather curious result. With the exception of five, all the architects in the city are involved by the action of the Dundee Institute, and the selection for the Technical Institute Committee is thus very limited. It is stated that four of the architects of the quintette who are left with a free hand have sent in plans, but it is understood that the Technical Institute Committee are not bound to accept a local architect's plans, although the competition was restricted to the city. Should the committee so resolve, it is stated that the architects who have refused to accept the terms of the competition do not intend to let the matter rest.

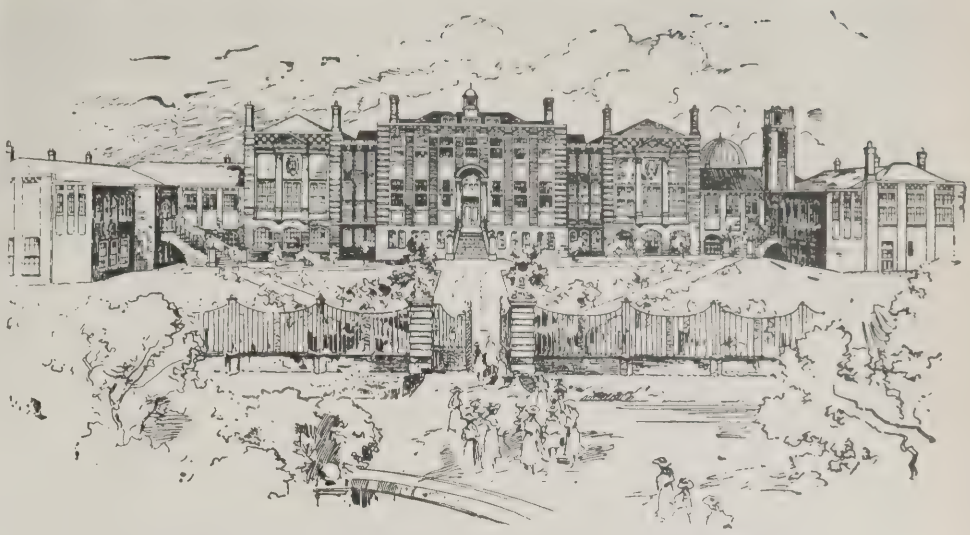
Library, Kendal.

In a competition for the above, among architects either in practice at Kendal or natives of that town, the design of Mr. T. Frederick Pennington, A.R.I.B.A., of Hounslow Heath, Middlesex, has been selected. There were eleven competitors.

List of Competitions Open.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
March 28	LIBRARY AT FAILSWORTH (to cost £3,000). Premiums of £20 and £10. Conditions from H. C. Broome, clerk, Council Offices, Failsworth. Deposit, One guinea.
March 30	LIBRARY AT DUDLEY.—Limited to architects practising within 50 miles. Conditions from H. C. Brettell, town clerk, Dudley.
March 30	PRESBYTERIAN CHURCH AT ROKER, SUNDERLAND.—Premiums of £25 and £15. Particulars from George W. Bain, 46, John Street, Sunderland. Summary in "Builders' Journal," Feb. 20
April 2	EXHIBITION COTTAGES AT SHEFFIELD & NEWCASTLE. Particulars from Henry R. Aldridge, 45, Bank Street, Sheffield.
April 30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May 11	SCOTTISH NATIONAL EXHIBITION AT EDINBURGH. — Premiums of £100 and £75. Conditions from J. Marchbank, 45 York Place, Edinburgh, Deposit, One guinea.
May 17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
No date.	HIGHLAND MANSES AND CHURCH BUILDINGS for United Free Church of Scotland. Conditions from J. T. S. Watson, 1, Castle Terrace, Edinburgh. Deposit, Two guineas.



SECONDARY SCHOOL FOR GIRLS, BARNSLEY: SELECTED DESIGN.
BUCKLAND AND HAYWOOD-FARMER AND ASHFORD, ARCHITECTS.

Correspondence.

Sunderland Children's Hospital Competition.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—On seeing the selected design for the above in your issue for March 13th, I was quite staggered by finding that the difference of level between the ground at one pavilion and at the other pavilion scaled only 10ft., whereas on the plan of levels submitted to competitors a difference of 16ft. is shown. This is "faking" competition drawings with a vengeance. But a faked perspective or a false elevation is nothing as compared with the sort of thing that went on in a competition for a fire station, &c., in Lancashire, decided last year. The winning design had shown the engine room (which was stipulated to be about 32ft. by 25ft.) in such a way that it would be impossible to get an up-to-date steamer housed therein. The assessor in this case was a very distinguished municipal buildings architect, but evidently his knowledge of fire-station requirements was not profound.—Yours truly,

LONDON. S.

Competition Drawings.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—If any reader can suggest a more practical method than that mentioned by "Competitor" in last week's issue, of knowing when one's drawings have been safely delivered, he will relieve many architects of much worry and anxiety which naturally occurs after the last rush when submitting a design.

In the recent competition for the Birmingham Town Hall Extension, several sets of drawings were returned to their owners by the railway company about three weeks after the sending-in date—having been left unopened and stored away in a lumber room during that time awaiting inspection. These sets had all been refused delivery by a red-taped junior official at the Council offices, who was over-anxious in carrying out the little brief authority entrusted to him by his superiors. The various designs were from ten minutes to a few hours late in being delivered; and to begin with, the hour—12 noon on a Saturday—was unreasonable. Many months of thought and labour, with the added cost of a perspective and travelling expenses, had been spent in the preparation of these drawings, and it appears to be a surprising state of affairs when no compensation could be claimed from the railway company simply because the package did not contain "Perishable Goods" according to the by-laws. Some pressure might be brought to bear by the Royal Institute of British Architects, and also by the architectural societies throughout the country, petitioning the various railway companies to include plans in the same list as food produce if necessary, so that some guarantee would be made of a speedy delivery. No one would object to paying a trifle extra over the ordinary rates if it also included a decent insurance sufficient to cover, at any rate, the preparation of the drawings. Some system is wanted badly whereby the architect's interests can be safe-guarded, so that the drawings are not carelessly left behind at railway junctions and delayed beyond a reasonable time or handled roughly by the porters.—Yours truly,

W. EDWARDES SPROAT.

LIVERPOOL.

GIRLS' SECONDARY SCHOOL, BARNSLEY.

We illustrate above by a sketch (for which we are indebted to the "Sheffield Daily Telegraph") the selected design for the new secondary school for girls which is to be built at Barnsley at a cost of £14,750, the architects being Messrs. Buckland and Haywood-Farmer and Ashford, of Birmingham, whose design was selected recently in competition. We illustrated the plans of the building in our issue for January 30th, when we gave a critique of the competition.

The Eighth International Congress of Architects, 1908, is to be held in Vienna.

Mr. Paul Hoffmann has removed from Palmerston House (where he has carried on his practice for the last 15 years) to new offices at Capel House, New Broad Street, recently completed.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

High Grain Bins.

LONDON.—BIN writes: "The accompanying sketch (redrawn) shows the end of a brick building to be used as a corn mill. It is proposed to form the whole end into a grain bin divided into three wooden divisions. This will be filled full to the roof with grain. How can I determine the thickness of the walls to resist the thrust of the grain? Must tie-rods be used, and, if so, how should these be spaced economically? The internal divisions are proposed to be formed with 3in. planed planks. I propose to bolt 11×3 pieces on each side from the ground to the roof and put $1\frac{1}{8}$in. tie-rods through these every 6ft. in height. Would this be sufficient to carry the grain in the side bins if the centre bin were emptied? I purpose bolting $3\times1\frac{1}{2}$ steel channels up the walls to take the ends of the 3in. plank divisions. Do you know of any work dealing with the construction of grain bins?"

Grain tends to spread like dry sand and thrust out the walls. The calculation may be made on the same principle as for water, allowing for the difference in natural slope. The natural slope of water is 0degs., grain, say, 30degs. Taking w as the weight per foot cube and h as height in feet, the total pressure of water against a wall is given by the formula $\frac{1}{4}wh^2 \tan^2 45 = \frac{1}{2}wh^2 \times 1$ and the pressure at base wh. In the same way the total pressure of grain will be $\frac{1}{2}wh^2 \tan^2 30 = \frac{1}{2}wh^2 \left(\frac{1}{\sqrt{3}}\right)^2$, and the pressure at the base $\frac{1}{3}wh$. Taking the weight of grain as 50lbs. per cubic foot and the height of building as 48ft. the pressure at bottom will be $\frac{1}{3}wh = \frac{1}{3}\times50\times48 = 800$lbs. per sq. ft. Fig. 1 shows the section of building and the ordinates to the triangle give the pressure per sq. ft. throughout the height acting on the other side of the wall. Taking the tie-rods as 6ft. apart both vertically and horizontally, as in the plan Fig. 2, the lowest tier will each have to withstand a force of $\frac{42}{48}\times800\times6\times6=$ 25,200lbs., say 11·25tons. Taking wrought iron as capable of safely resisting a dead load of 5 tons per sq. in. the nett area will be $\frac{11·25}{5}=2·25$ sq. ins., or say 1·7ins. diameter. A 2-in. diameter rod with a minus thread will have a diameter at bottom of thread of 1·72ins., so that this will just do. Allowing a maximum safe load on brick work in mortar of 5 tons per sq. ft. th area of washer-plate for this rod will be $\frac{11·25}{5} = 2·25$sq. ft., $= \sqrt{2·25} = 18$ins. square, and the thickness not less than $\frac{1}{24}\times18 = \frac{3}{4}$in. Now taking the tier of rods 6ft. down from the top the tension will be $\frac{6}{48}\times800$ $6\times6 = 3,600$lbs., say 1·6 tons, requiring a nett area of $\frac{1·6}{5} = ·32$ sq. ins., which will be very nearly given by a $\frac{3}{4}$-in. bolt, and the washer plate will be $\sqrt{·32} = ·57$ft., say 7ins. square, with a thickness of $\frac{1}{24}\times7 =$ ·29, say $\frac{5}{16}$in. The intermediate tie-rods must be calculated in the same way. The walls may be considered as strong enough to resist the pressure of the grain between the tie-rods, but cannot be taken into account as retaining walls in relieving the tie-rods of any stress. If separate bins are to be made by wooden partitions, the load at the bottom will be 800lbs. per ft. run, and with 6ft. between the uprights and tie-rods the thickness will be given by the equation $\frac{800\text{L}}{112} = \frac{bd^2}{\text{L}}$, whence, taking b as 1ft. high and L as 6ft. span, $d^2 = \frac{800}{112}\times6^2$, or $d = \sqrt{257} = 16$in. solid timber. At 12ft. up the figures will become $d = \sqrt{\frac{36}{48}\times\frac{800}{112}\times6^2} = \sqrt{193} = 14$ins. thick, so that the 3-in. planking proposed is utterly useless and the arrangement will require reconsideration. Whatever partitions are put in the tie-bolts must be separate across each bin, as in Fig. 1. The writer does not know of any book dealing with constructions of this kind.

HENRY ADAMS.

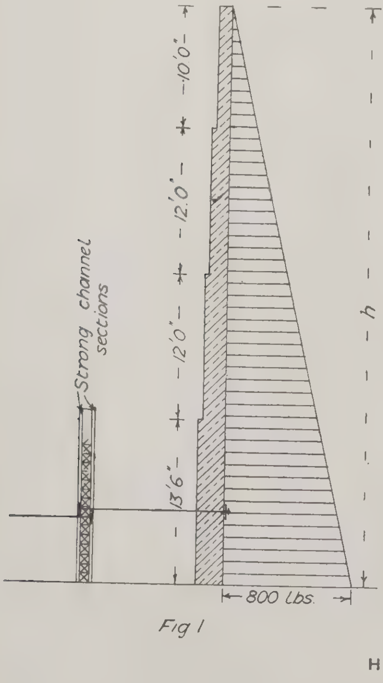


Fig 1

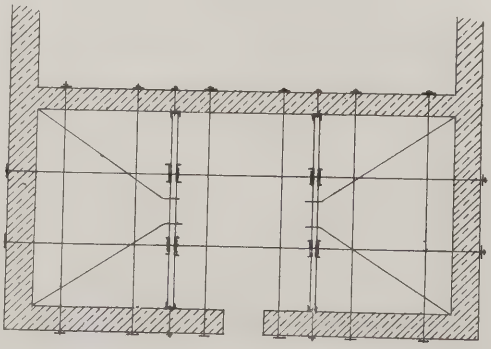


Fig 2

HIGH GRAIN BINS.

English Architects in India.

LLANFAIRFECHAN. — KITAB writes: "What are the prospects of architects in India? I should of course go out as an assistant at first and to Bombay for preference, but I do not know what to expect."

So far as we are aware, the prospects of an English architect going out to India with the idea of practising on his own account are not very hopeful. Most architects there are either under Government or connected with certain firms who do the chief building and contract work.

Notes and News

A New Town Hall for Bethnal Green is to be built at an estimated cost of £22,000.

A Hebrew Synagogue at Salford is being built at a cost of £6,000, to accommodate 420 worshippers. Mr. Delissa Joseph, F.R.I.B.A., of London, is the architect.

Change of Address.—Messrs. Muir and McIlwraith, architects and surveyors, have moved from 42, Bloomsbury Square to 4, Raymond Buildings, Gray's Inn, W.C.

London's newest hotel is the University Hotel in Endsleigh Gardens, W.C. It has been executed from the designs of Messrs. Collcutt & Hamp, and contains 136 bedrooms and 24 bathrooms.

Alterations and renovations at the Palace Theatre, Shaftesbury Avenue, W., are to be carried out by Messrs. Patman and Fotheringham, Ltd., under the supervision of Mr. J. Emblin-Walker, architect.

Messrs. Mar[illegible]or, Ltd., provided accommodation and hospitality for their numerous friends on the occasion of the Oxford and Cambridge boat-race, their premises at Crab-Tree Wharf, Fulham, being an excellent vantage-point from which to see the race.

Architectural Association of Ireland.—At last week's meeting of this Association Mr. F. Shaw read a paper on "The Evolution of Earthenware and Fireclay Goods." He dealt with the advance of sanitation during the last quarter of a century, describing in some detail the processse of manufacture.

Messrs. L. & C. Hardtmuth, the well-known pencil makers (London office, 56, Ludgate Hill, E.C.), have just issued an attractive catalogue, fully illustrated in colour, and giving facsimilies of their seventeen grades of "Koh-i-Noor" pencils, together with specialities in copying-ink pencils, rubber, brushes, and other drawing requisites.

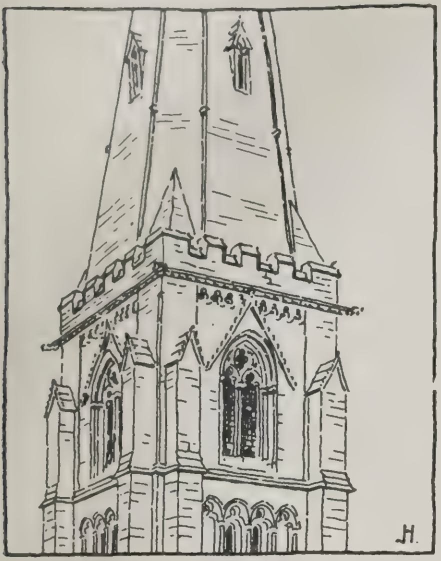
Institute of British Decorators. The annual dinner of this institute was held last week at the Trocadero, Mr. J. D. Crace, president, in the chair. Mr. W. H. Pitman, in proposing the toast of "The Institute," said it was founded seven years ago and now had about 450 members on its roll. It at present derived most of its support from the provinces, but he hoped that greater interest would be aroused in it among the decorators of the metropolis in the near future. The president, in responding, said the main object of the institute was the promotion of the artistic and intellectual side of decorative art.

The report of Messrs. Shanks and Co., Ltd., for 1906 states that despite the continued depression in the building trade and the high cost of raw materials the results of the year's trading have been fairly satisfactory. The nett balance at credit of profit and loss account, after providing for bad and doubtful debts, depreciation, salaries and other charges, is £10,173. It is proposed to transfer to reserve fund, in accordance with the articles of association, not less than 10 per cent. of the sum available for dividend on the ordinary shares, £2,573; to directors' fees, £200; and to goodwill, £335; leaving a balance of £6,196, which the directors recommend should be dealt with as follows:—To pay the ordinary shareholders a dividend at the rate of 6 per cent. per annum for 1906, leaving a balance to be carried forward, subject to payment of auditors' fees, of £2,296.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Eighth Series.)

CLASS A (ARCHITECTURE).



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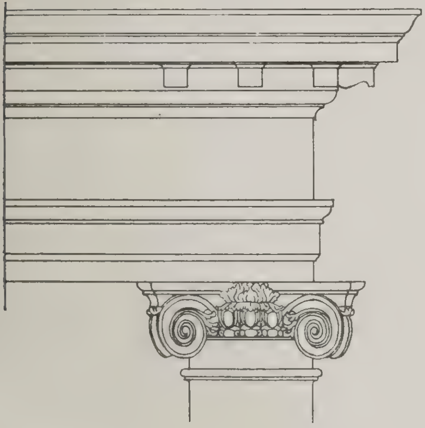

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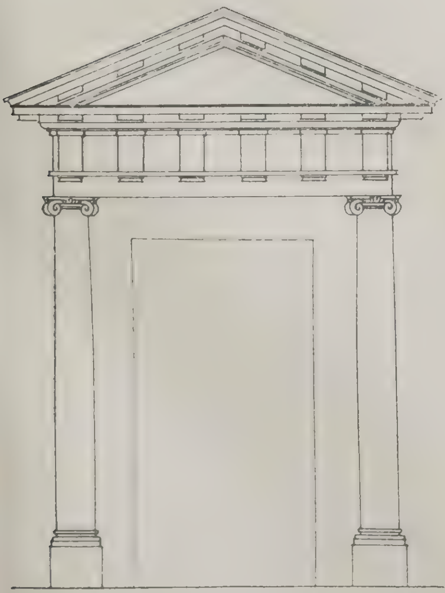

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This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

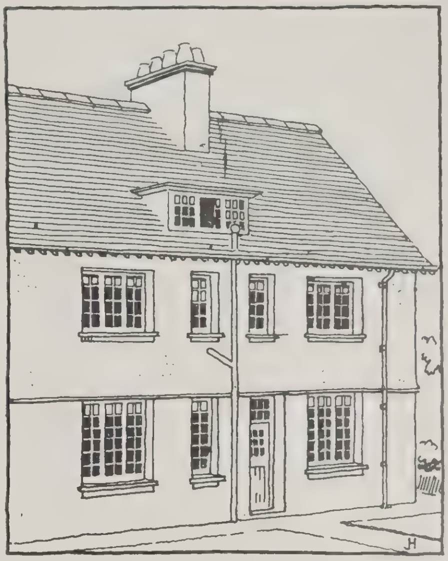
10. Any violation of these rules will entail disqualification.

11. The Editor's decision on every matter will be final.

(*For Coupons see page iv.*)

Copies of "THE BUILDERS' JOURNAL" *in which the first, second, third, fourth, fifth sixth and seventh series of pictures appeared can now be obtained from the Publisher. The dates of the issues are February 6th, February 13th, February 20th, February 27th, March 6th, March 13th and March 20th respectively.*

CLASS B (BUILDING).



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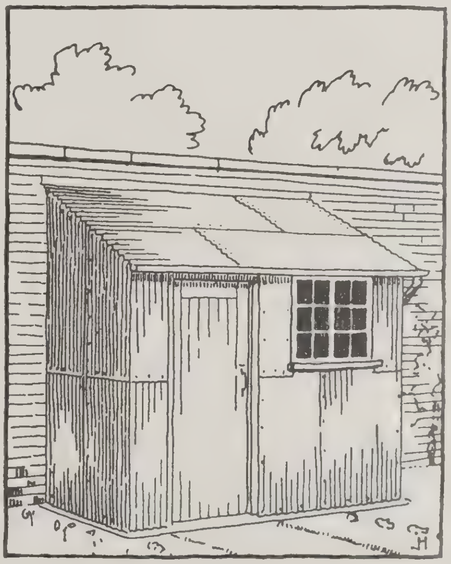

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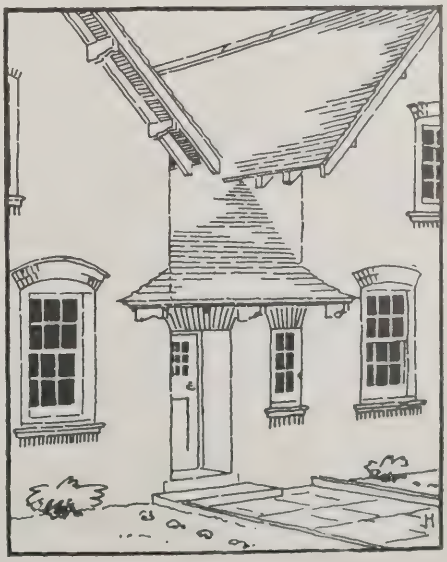

B 24

Appointments Wanted.

ARCHITECT & SURVEYOR'S ASSISTANT desires ENGAGEMENT; town or country; R. San. Inst. diploma; contract drawings; details; specifications; superintend works; surveying and levelling.—H., 10, Rollscourt Avenue, Herne Hill, S.E. 2487

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BRICKLAYER (disengaged) wants JOB; piecework or as Working Foreman; used to contract and good class speculating work; good references.—A. Spatcher, 11, Sunnydene Street, Sydenham Road, Sydenham, S.W. 2480

BRICKWORK, POINTING, etc., WANTED, by piece or measure, with or without groundwork, concreting, drainage, tiling, or slating; work done by schedule prices or entire charge.—56, Fletcher Road, Chiswick. 2517

BUILDER'S CLERK, Timekeeper and Material Clerk; Draughtsman and Tracer; book-keeping, measuring up, &c.; experience in concrete block construction—Box 2519, Builders' Journal Office 6, Great New Street, Fetter Lane E.C.

BUILDERS' MERCHANTS; young man (32) seeks BERTH; town or country; ten years last place; wharf clerk; manage depot, &c.; shorthand; moderate salary.—To W. R. E., 19, Rosebery Ave., Thornton Heath, Surrey. 2518

BUILDER, CONTRACTOR, and DECORATOR'S CLERK (37), with very large town and country experience in good firms, seeks ENGAGEMENT; expert and reliable; estimator for every branch, and competent; take charge office, or outside management.—"Assistant," 28, New North Road, Islington, N. 2526

BUILDER and CONTRACTOR'S CLERK (experienced), aged 35, seeks SITUATION; disengaged; materials, daywork, time, p.c., and general routine; town or country; good references.—A. W., 18, Northcroft Road, West Ealing. 2478

BUILDER'S AND CONTRACTOR'S GENERAL ASSISTANT seeks RE-ENGAGEMENT; highest references; quantities, estimating, drawing, specifications, book-keeping, variations, and outside supervision; town or country, or would manage branch.—Trudgett, Berkswell, Coventry. 2507

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CLERK (20) desires SITUATION in a Builder's office; thorough knowledge of general routine; good draughtsman, neat tracer: able to assist with estimates, taking off quantities, etc.; salary 30s.—Box No. 2500, Builders' Journal, 6, Great New Street, Fetter Lane, E.C.

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GENERAL FOREMAN (good) or CLERK OF WORKS wants SITUATION; quick draughtsman; can take out quantities, &c.—Write J. P., 8, North Road, Brighton. 2477

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GENERAL or WALKING FOREMAN requires BERTH; joiner; 39; capable and energetic; experienced in all trades; good manager and time-keeper; plans; measuring-up and estimating; good testimonials.—Box 2475, Builders' Journal, 6, Great New Street, Fetter Lane, E.C.

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QUANTITY SURVEYORS' ASSISTANT (22) requires ENGAGEMENT; 6 years' London experience; thoroughly competent; working up; accounts, &c.—Box 2521, Builders' Journal Office, 6, Great New Street, Fetter Lane, E.C.

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TO ARCHITECTS, BUILDERS and OTHERS.—ADVERTISER, having considerable experience in the erection of first class Villa Residences, seeks RE-ENGAGEMENT as Foreman; good Draughtsman, &c.; good references.—Apply Capable, c/o Norris, 137, Francis Road, Leyton. 2520

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SPECIAL NOTICE.

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Supplement to
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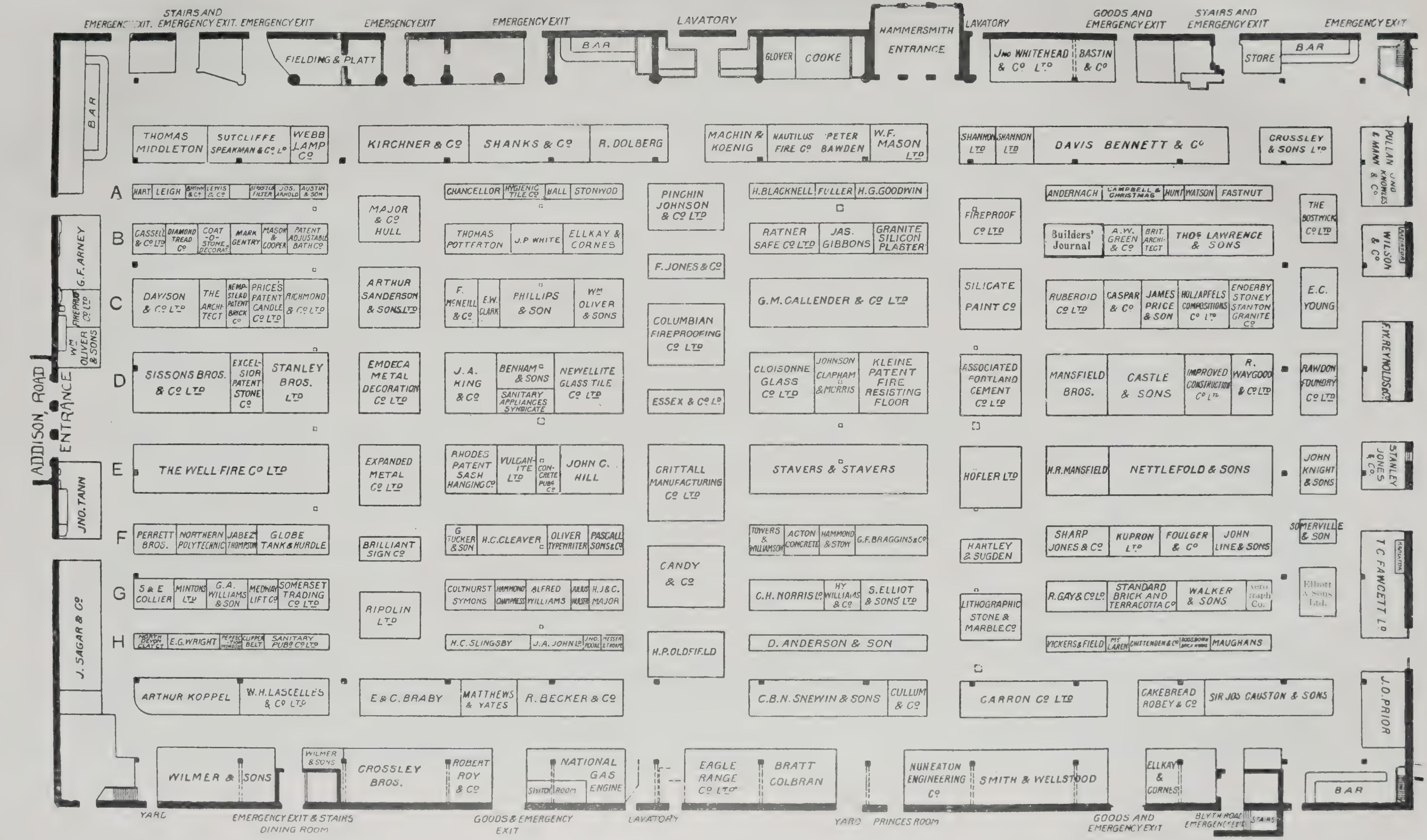
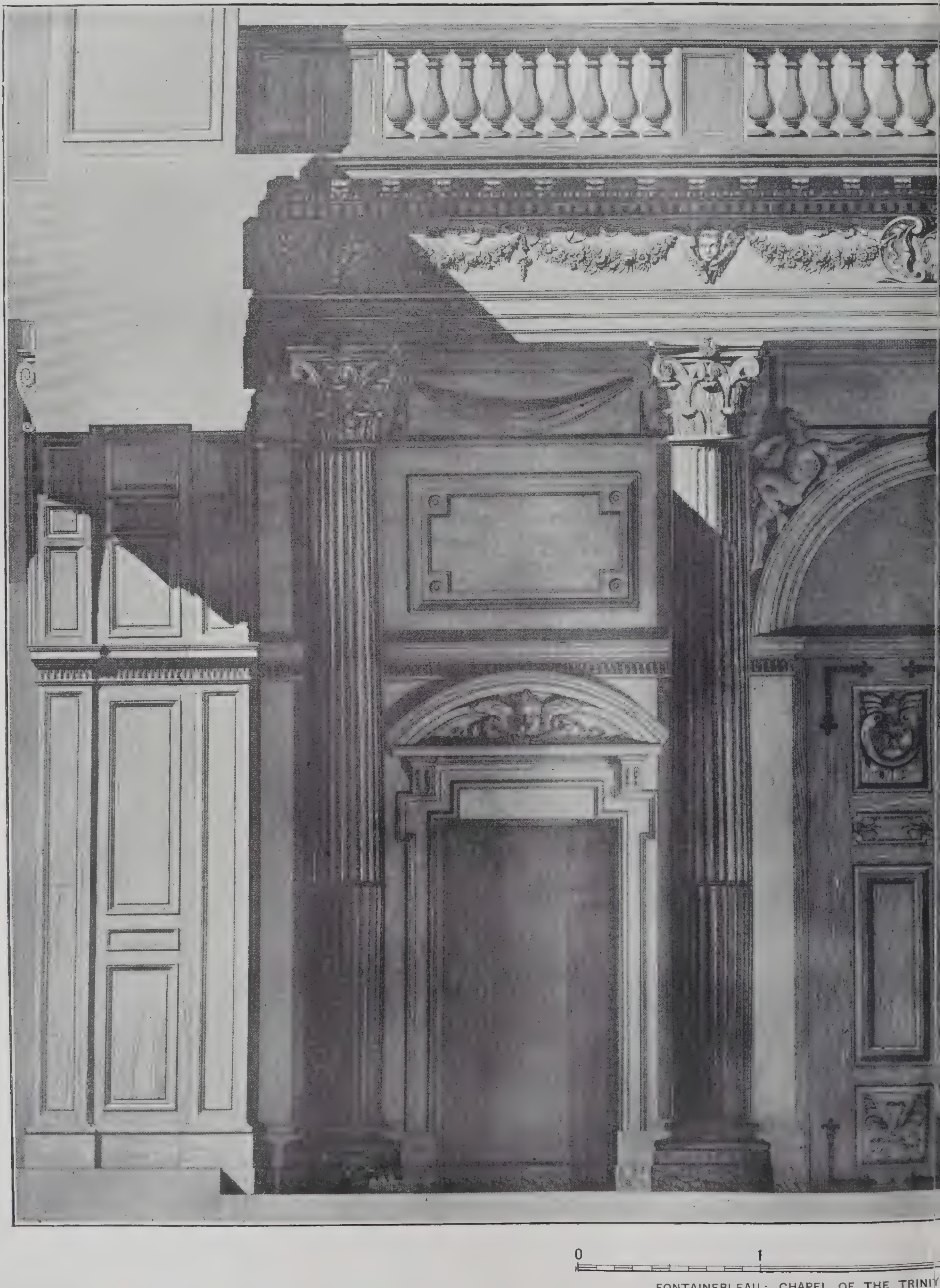
Wednesday, April 3rd, 1907.



BUILDING TRADES' EXHIBITION, OLYMPIA: PLAN OF MAIN HALL

Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, April 3rd, 1907.



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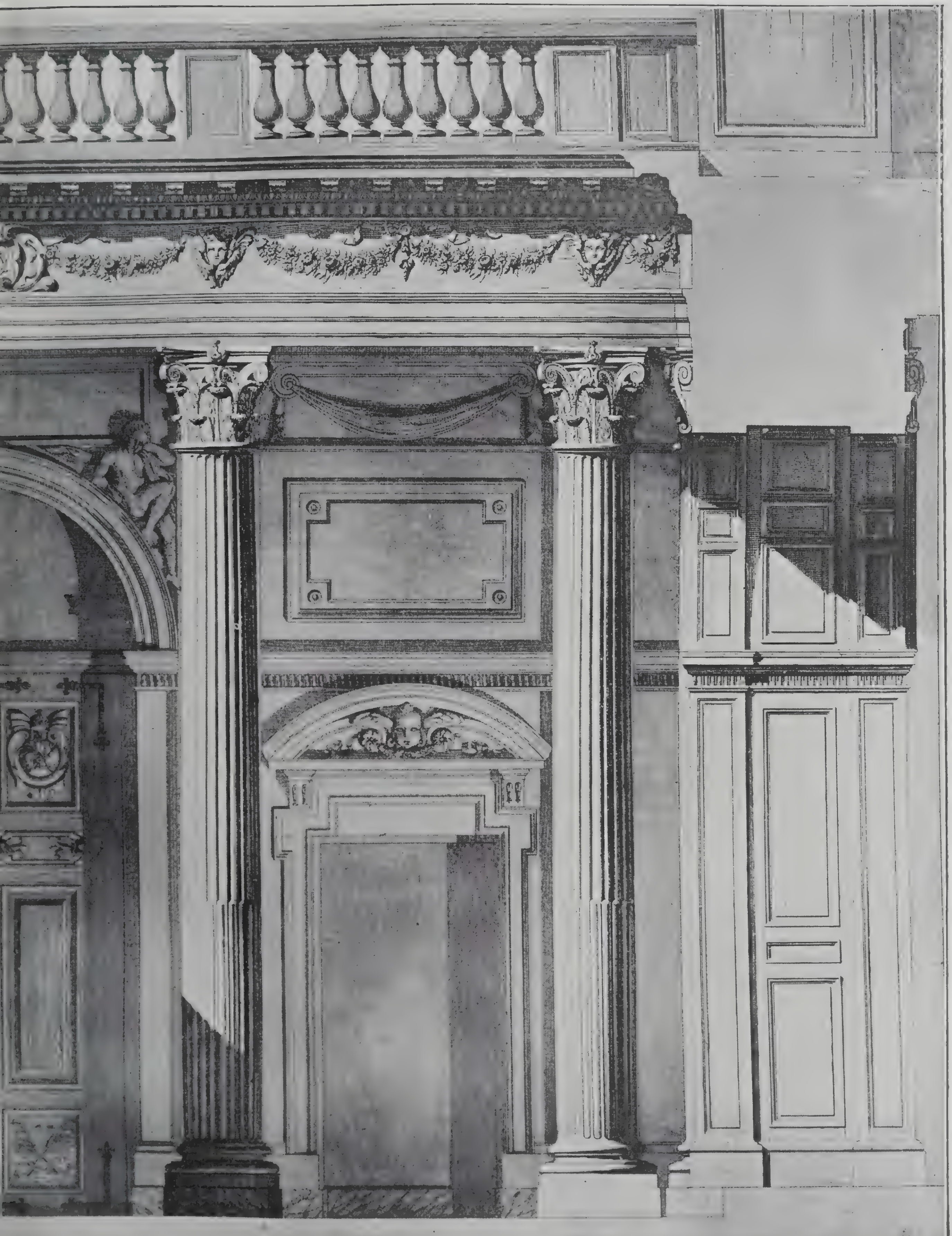
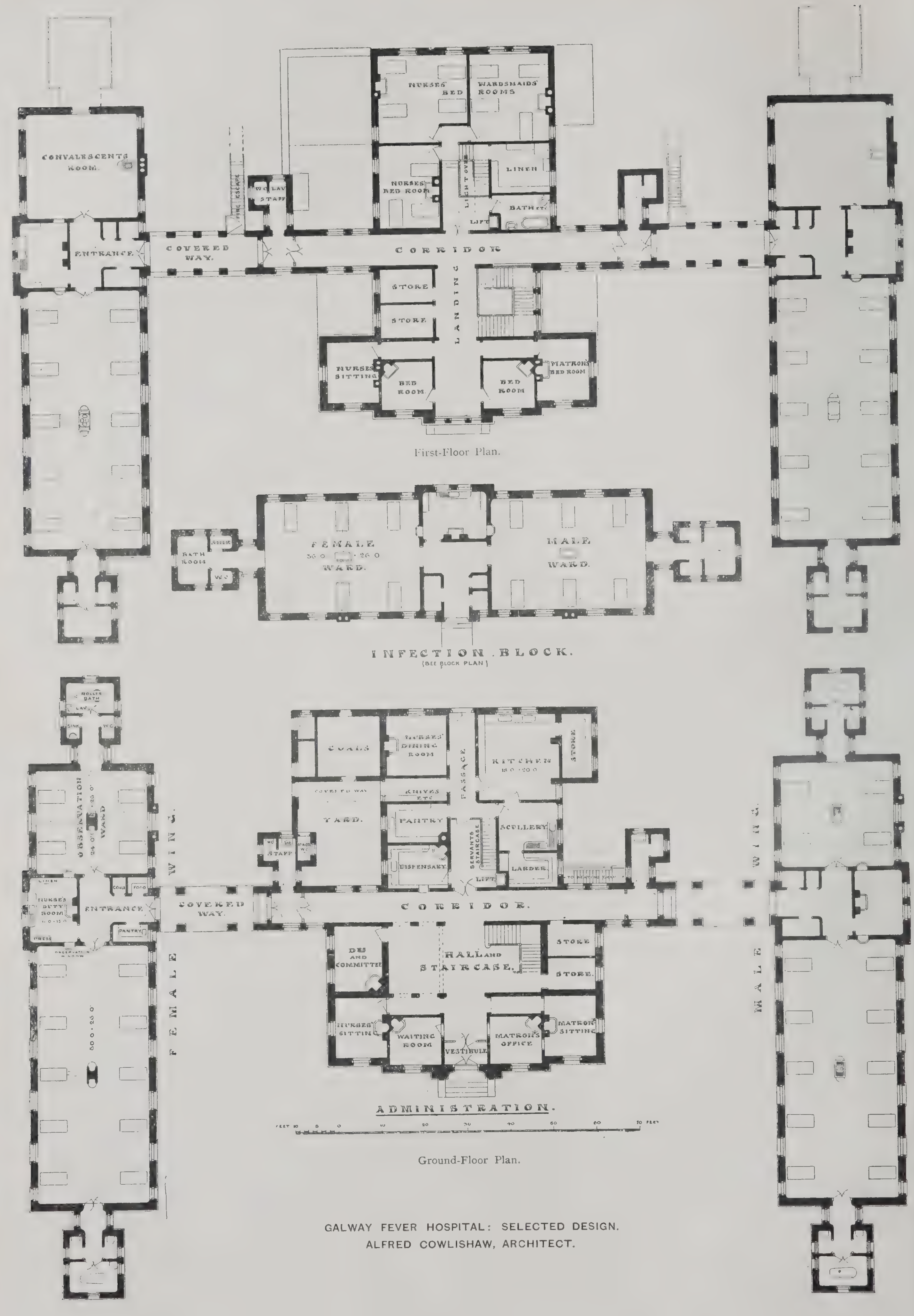


IN ENTRANCE DOOR, WITH GALLERY OVER.

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, April 3rd, 1907.



GALWAY FEVER HOSPITAL: SELECTED DESIGN.
ALFRED COWLISHAW, ARCHITECT.

April 3, 1907. Volume 25, No. 634.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

Notices.

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The **"Contractors'" Supplement** is given in this issue.

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The Philae Temples. READERS will recollect the stir which was made over the partial submersion of the Temples at Philæ, caused by the raising of the water level of the Nile by the great barrage at Assouan. For five months of the year the great Temple of Isis and the small building known as Pharaoh's Cradle are more than half submerged, and can only be visited in boats, and even then only when the Nile is low. As the result of this partial submersion the gateways, walls and pillars are stated to be disfigured by a water-mark of green slime, while it has been found necessary to still further disfigure them by timber shoring. These Temples of Philæ are undoubtedly of great value, and extremely beautiful. They are not by any means so important archæologically as many other structures in Egypt, being quite late in date, though to the majority of ordinary visitors to the land of the Pharaohs they are of as much interest as the far more valuable remains at Karnak. When the submersion of the land upon which they stand was proposed, everyone was forced to recognise that the benefits of that great undertaking, the Assouan Dam, rendered the act inevitable, however great the interest of the buildings concerned. Most careful records were taken of these temples, so that the archæological loss might be minimised as much as possible, and it was thought that their picturesque value had been in great part preserved by their remaining visible for more than half the year, while partially submerged for the remainder. The further raising of the Nile dam has been talked of for some time, and it now appears that the proposal will be adopted. The Assouan dam is to be raised by 19½ft. at a cost of £1,500,000. It would certainly be most regrettable that such interesting architectural remains should be hidden from sight; hence, the only proper course to pursue seems now to remove and re-erect the temples. Some other island could surely be found which would give a semblance of their former surroundings, but failing this they should be erected on the mainland.

Interim Report on St. Paul's. THE Committee of Experts which was appointed to enquire into the stability of St. Paul's Cathedral have drafted an interim report. The Committee, it will be remembered, consisted of Sir Aston Webb, R.A., Mr. T. E. Collcutt, and Mr. John Belcher, A.R.A. It is understood that their report deals almost entirely with the probable effect of constructing a sewer near the south side of the Cathedral. They are stated to have come to the unanimous conclusion that the tunnelling operations connected with the laying of the sewer would be a serious additional source of danger to the structure. We have already expressed the opinion that the foundations of the part in danger should be underpinned and then the sewer, the line of which is some distance away from the Cathedral, could be constructed if necessary. Perhaps the final report may support our view. In the meantime apparently the London County Council will be asked to refrain from pushing on the construction of the sewer.

New, True, or Neither

Architects have to do sometimes with property documents, and it is worth while giving the following, taken from a recent legal document (it would appear to give the property described no chance of escaping from the owner's hands):—"... as are delineated in the said plan and therin coloured yellow or by whatsoever name or names the said copyhold messuage land and hereditaments hereinafter described or any or either of them or any part or parcel thereof heretofore have or hath been late were or was or now are or is called or known or howsoever otherwise the same or any or either of them or any part or parcel thereof heretofore have or hath been late were or was or now are is or ought to be laid together fenced parted butted bounded described or distinguished ...." "... and also all that messuage or tenement in which Nathaniel C—— formerly lived, wherein Benjamin B—— afterwards dwelt and where Daniel B—— since dwelt and wherein the said Jonathan B—— now dwells ...."

* * *

I have looked over the list of exhibitors at the forthcoming Building Trades' Eghibition at Olympia, but can find no architect's name there. This really is missing one's opportunity. Surely some of those gentlemen who belong to a certain "society" or "institute" which gives them letters after their names, but of whose whereabouts and meetings (if any) there is much mystery—surely one of these "architects" might have broken away from a moribund convention, and displayed himself and his wares at a stand. He might have yards of plans and perspectives, with bills about after this style:—

* * *

"Every kind of architectural work undertaken. Send for sample. Cottages of all sizes forwarded on receipt of stamp: churches by wire, cathedrals by post. *Vide* recommendation from Sir H. C.-B.: 'Delighted with your splendid catalogue. Shall bring it before House. Please send me C45, cheap Hatfield.' Have you tried the 'Ajax' house for suburbs? If not, do so at once. A child can use it. Reinforced in every part. Real hair in the plaster, drains fore and aft, and front door fitted with adjustable porch, which can be taken off in the summer and used as a garden ornament. No extras."

* * *

I hear that two distinguished architects, noted for their forceful language, are about to issue a book on "The Bricklayer's English," with an appendix of special words by an American building superintendent.

THE LOOKER-ON.

THE ORDNANCE SURVEY.

By **Harold Slicer.**

Few people have any idea of the time and work involved in the preparation of the Ordnance maps. The survey of small estates will be familiar to most, but the undertaking of the survey of the United Kingdom is quite another matter. Here we get triangulation lines, some more than a hundred miles long, and some also over the sea.

The rebellion in Scotland in 1745 first showed the necessity of having proper maps of the country, for the leaders of the various Government forces found themselves handicapped among unknown hilly country of which they possessed no maps. After the battle of Culloden a survey of Scotland was taken in hand by Lieut.-General Watson, but the work had to be abandoned, and the maps were never published on account of war breaking out with France. In 1763 a general survey of the whole country was proposed. It was not, however, until the end of the eighteenth century that a general survey to the scale of 1in. to the mile was authorised.

The French Government, who had been moving in a similar manner, proposed to us in 1783 that we should lay down a system of triangulation in the south-east corner of England, so that the relative positions of Paris and Greenwich might be ascertained. This application of the French Government gave rise to what is now known as the Ordnance Survey. In August, 1784, General Roy, who had been connected with the Scottish Survey many years before, measured a base line five miles long on Hounslow Heath.

Now, the accuracy of the whole triangulation depended upon these measured bases, for from the ends of the measured base a point is sighted, its angles are read, and the two remaining sides of the triangle calculated therefrom. This measured base must be accurately determined, because its length is very short compared with the lengths of the sides of the triangle springing from it, and any slight inaccuracy would be magnified as the triangulation extended.

The measuring rods used for the base on Hounslow Heath were of (1) wood, (2) steel, (3) glass. The wood and glass rods were 20ft. long, the glass being in the form of tubes and the wood rods of deal. The steel was in the form of 100-ft. chains. The line was measured three times, each form of rod being used once, the greatest care being taken to ensure true alignment, level, and contact at ends, and allowances being made in alteration of lengths due to temperature changes. The lengths as measured by the wood rods was disregarded, the line as measured with them being 2ft. longer than by the other kinds of rods. The *average* length as measured by the glass and steel rods was 27,404ft. and a few inches.

General Mudge remeasured this base again in 1791 with steel chains composed of 40 links, 2½ft. long each, and ½in. diameter metal; cannon were then sunk vertically in the ground, their muzzle centres being the ends of the base.

The instruments available were very primitive and clumsy, but one prominent instrument-maker, Ramsden by name, came to the rescue. He did not finish his instrument, however, till early in 1787, so that the triangulation was delayed nearly three years. By means of Ramsden's 3-ft. instrument the triangulation was carried out to the French coast before the end of 1787, and bearings were taken across to the French coast, and *vice versa*, and the triangulation of the two countries thereby connected. The 3-ft. instrument of Ramsden was remarkable in its day (it can be seen in the South Kensington Museum), but the modern 12in. theodolite is capable of performing work quite as accurate.

This being completed, the triangulation was carried in an easterly direction, and to the north, from a new base measured on Salisbury Plain in 1794. The Scottish borders were reached in 1809, but, money being scarce on account of war, the preliminary triangulation was not completed until 1851—the year of the Great Exhibition. There were 1,554 bearings read, about 250 stations being used, these stations being hill tops, church steeples, &c., and high staging where there was no conspicuous object.

The Salisbury line was again measured with Major-General Colby's computation bars, as its length did not agree by computation with a carefully measured base on the shore of Lough Foyle in the North of Ireland. As a result of this remeasurement the length was increased 1ft., this being the last base measured. Other bases were:—

Sedgemoor, Somerset, 27,680ft., in 1798.

Misterton Carr, Lincs., 26,342ft., in 1801.

Rhuddlan Marsh, Flints., 24,514ft., in 1806.

Belhelvie Links, Aberdeenshire, 26,515 feet., in 1817.

Shore of Lough Foyle, Ireland, 42,240ft., in 1828.

The measurement of base lines can now be carried out so accurately that the error is not more than 1-16in. in a mile, or one-millionth.

The longest side of the triangulation was 111 miles, measured between Slieve Donard, the highest of the Mourne Mountains (Co. Down) and Scafell, Cumberland. Eighteen sides measured between 90 and 100 miles, eleven exceeded 100 miles, and there were 37 whose sides were between 80 and 90 miles. By means of a 12-in. instrument these triangles were again subdivided into smaller ones having sides of about 5 miles, which were again subdivided into triangles of an average side of about 1 mile. Reflectors were used for distinguishing the stations; all types were tried at one time or another; that which answered best, however, was the common mirror reflecting the sun's rays for day signalling; the smallest were of 5ins. diameter, the largest 20ins. by 16ins., the sunlight being reflected through a small ring (previously set in correct position and direction by means of the theodolite) and easily visible at the greatest distances. Various kinds of lights and powerful reflectors were used for night signalling, but weeks sometimes passed before a signal was seen, on account of the unfavourable atmosphere. As an inducement to the staff

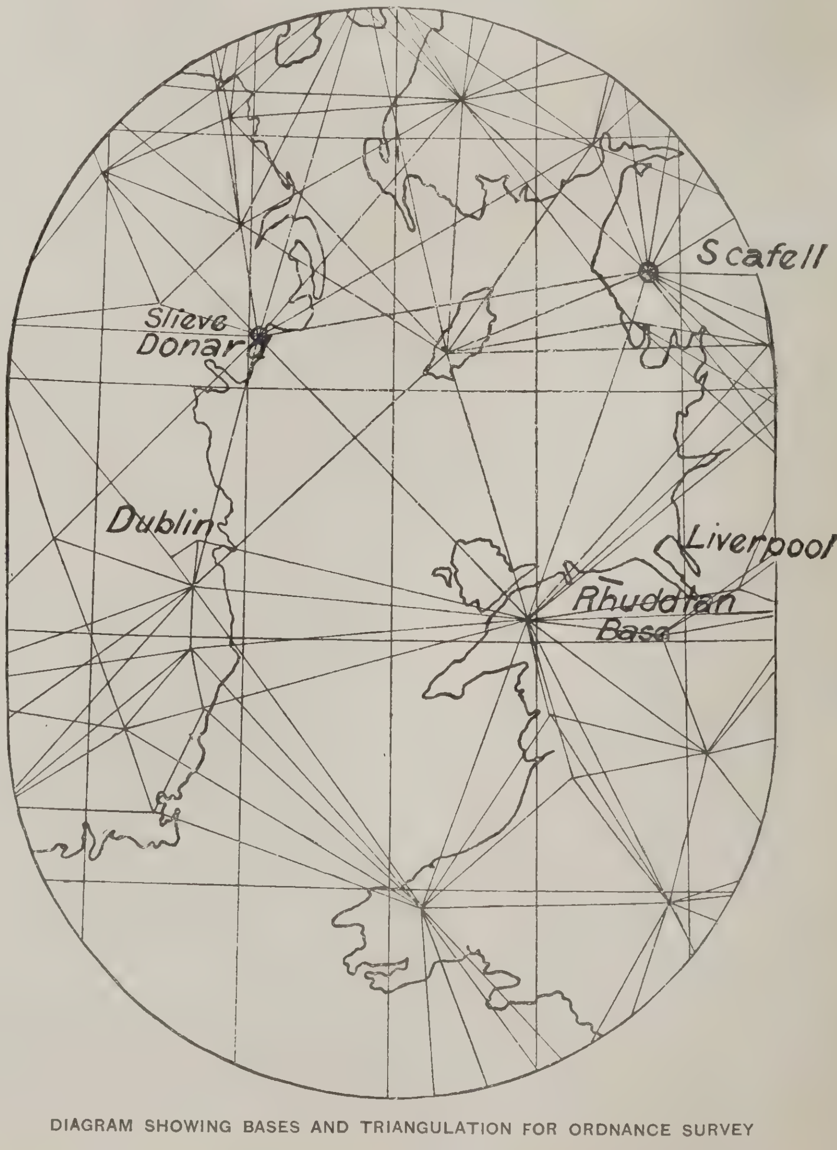
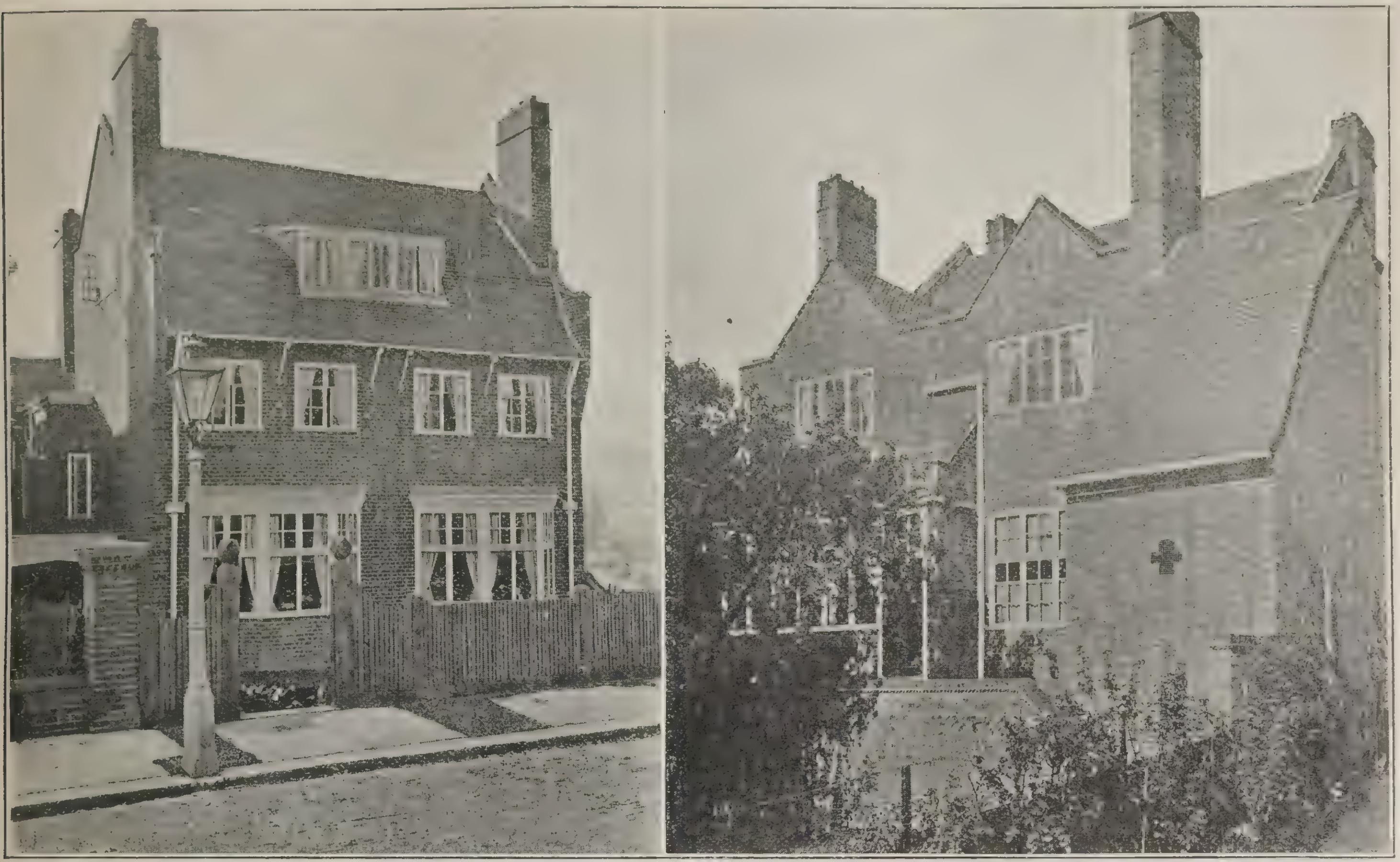
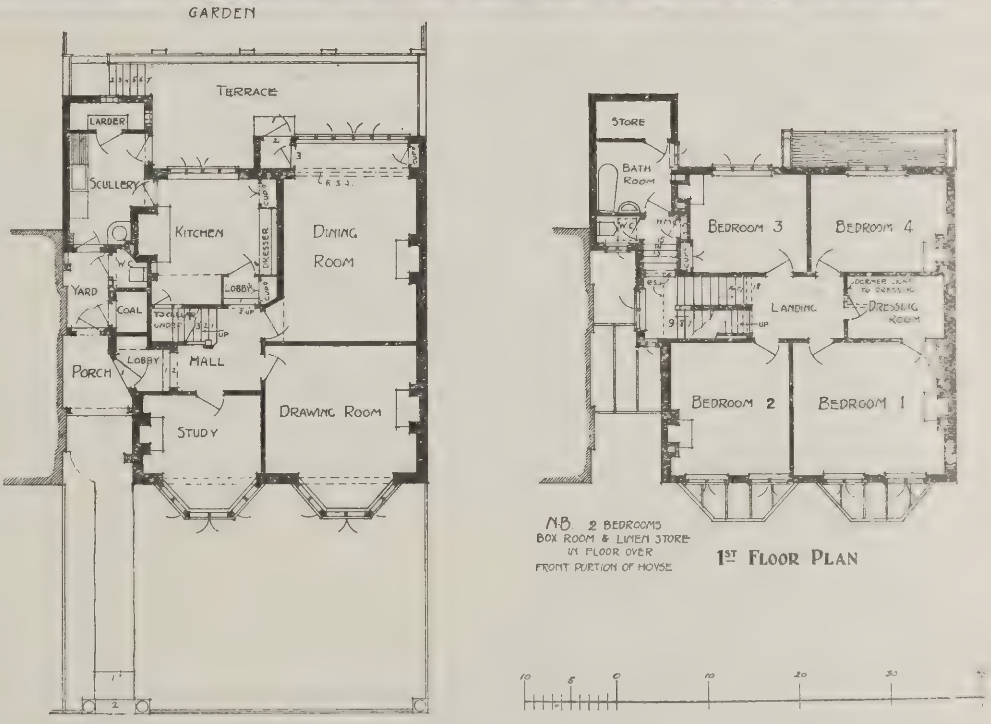


DIAGRAM SHOWING BASES AND TRIANGULATION FOR ORDNANCE SURVEY





N.B. 2 BEDROOMS BOX ROOM & LINEN STORE IN FLOOR OVER FRONT PORTION OF HOUSE

GROUND PLAN

1ST FLOOR PLAN

HOUSE AT NEW BARNET, HERTS. GEOFFRY LUCAS, A.R.I.B.A., ARCHITECT.

This house has just been built for A. E. Passingham, Esq. The materials are red bricks for walling, and tiles for roofs, with white painted casements. The entrance was placed on the side of the house at the client's wish, so as to obtain rooms as large as possible in the width of the house. The contractors were Messrs. J. W. Willmott & Sons, of Hitchin and Hornsey, and the architect was Mr. Geoffry Lucas, A.R.I.B.A., of 16, Hart Street, W.C., and Hitchin, Herts.

extra remuneration, ranging from 1 to 20 shillings, was paid for the first flash seen!

The ground was then gone over by a surveyor, who filled in the detail by actual measurement. The surveyor's book was sent to the office, the whole was plotted on paper, a tracing made, and an examiner then went over the ground to see that all was correct—names, woods, fences, houses, &c.—before the maps were finished.

The maps are always under revision, divisions of the Ordnance Survey Staff being stationed in various parts of the country, as at York, Bristol, &c.

On account of the curvature of the earth the stations on flat country had to be raised in order to sight them.

A general map of the whole of Great Britain and Ireland to the scale of 1in. to the mile has been prepared on a uniform system. There are now two series, known as the new and old series, for England and Wales, the size of the new series sheets being 18ins. by 12ins., whilst of the old series sheets some are quarter-sheets (18ins. by 12ins.) and some full sheets (36ins. by 24ins.).

County maps are drawn to a scale of 6ins. to the mile, full sheets being used, and for some counties quarter sheets, which show 6 by 4 miles and 3 by 2 miles respectively. The quarter-sheets bear the same number in Roman figures as the full sheet, with additional letters N.W., N.E., S.W., S.E., according to their position on the full sheet, which they unitedly form.

The accompanying map shows part of the system of main triangulation referred to and the way the various triangles were connected.

Parish maps are drawn to the scale of $\frac{1}{2500}$, or 25·344ins. to the mile, one sheet showing an area of 1 by $1\frac{1}{2}$ miles, or approximately one acre per sq. in.: therefore sixteen parish maps form one 6-in. full sheet. They are very valuable for estate purposes.

Town maps are drawn for towns of more than 4,000 inhabitants to a scale of $\frac{1}{500}$, or 41·66ft. to 1in. These sheets represent 24 chains by 16 chains, contain 38·4 acres, and show the arrangement of garden beds. Other town maps are drawn to a scale of $\frac{1}{528}$, or 10ft. to the mile, and some to a scale of $\frac{1}{1056}$, or 5ft. to the mile.

The name Ordnance was derived from the fact that it was at one time under the Board of Ordnance, thence Ordnance Survey. The Ordnance Survey is now under the Board of Agriculture and Fisheries.

Enquiries Answered.

Questions should in all cases be addressed to the Editor and be written on one side of the paper only.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Bressummer Girder to Carry Overhanging Bay.

REGULAR READER writes: "Which is the best method of supporting a new projecting bay on to a steel girder over a shop, as shown by accompanying sketch, assuming that the total weight of the new bay was 6 tons, and the remaining weight coming on girder 8 tons—total 14 tons?"

There is very great objection to an overhanging bay being carried by a bressummer girder when the floor joists do not run from front to back, as there is nothing to prevent the girder from twisting over except its connection to the stanchions, but this does not balance the bending moment which tends to overthrow girder and stanchions together. The conditions to be met are a distributed load of 8 tons on a span of 13ft. and a twisting moment of 6×2=12 ton-ft. total, or 6 ton-ft. at each end. The girder may be balanced against overturning by connecting arms to the ends and building them into the side walls. These would act as cantilevers and each would have to resist a nett bending moment of 6 ton-ft. Taking an 8-in. by 5-in. by 28-lb. B.S.B. and deducting two $\frac{13}{16}$-in. rivet holes, a safe pull of 9 tons may be allowed on the top flange; this is equivalent to a bending moment of $9\times\frac{2}{3}=$ 6 ton-ft. on the 8-in. depth. The load from the brickwork may be taken at 1 ton per ft. run, and the length under distributed load to give 6 ton-ft. will be $\sqrt{6\times2}=3{\cdot}464$, or, say, 3ft. 6ins. A similar piece of rolled joist, and connected in the same way, may be put under each angle of the bay to carry its weight, and 6-in. by 3-in. by 12-lb. rolled joists may be inserted under each wall of the bay. For the main girder assume two 8-in. by 6-in. by 35-lb. B.S.B. rolled joists. These will carry $10{\cdot}4\times2=$ 20·8 tons distributed on 13-ft. span. The actual load distributed is $8+6=14$ tons, and the flange area $3{\cdot}582\times4=14{\cdot}328$ sq. ins., of which only $\frac{14}{20{\cdot}8}\times14{\cdot}328=9{\cdot}55$ sq. ins. are utilised, leaving $14{\cdot}328-9{\cdot}55=$ 4·778 sq. ins. to take the torsion. With a radius of 3·7ins. and a value of 5 tons per sq. in. on 4·778 sq. ins. a moment of resistance of $\frac{5\times4{\cdot}778\times3{\cdot}7}{12}=7{\cdot}36$ ton-ft. will be furnished as against 6 ton-ft. required at each end of bressummer. The arrangement will be as shown in Fig. 1 in section and Fig. 2 in plan.

HENRY ADAMS.

Licensed Premises.

LONDON.—SUBSCRIBER writes: "Are there any special building regulations affecting licensed premises other than those of the Building Act?"

There are no special building regulations affecting licensed premises other than those of the London Building Act, 1894, and other Acts affecting buildings in general. It must, however, be borne in mind that no licensed premises may be rebuilt or altered in any respect unless the sanction of the Licensing Justices of the Division in which the premises are situate be first obtained. For this purpose complete drawings must be deposited with the clerk to the Licensing Justices in accordance with the regulations in force in the Division, and the personal attendance of the license holder, and his architect, at the meeting of the Justices at which such plans will be considered will probably be necessary. Plans for alterations or rebuildings which involve no extension of area can probably be taken at any ordinary meeting, but in cases where extension of licensed area is required applications will, in most of the divisions, only be heard at the annual licensing day in February of each year. Full particulars, however, can be obtained from the clerk to the Justices.

Cost of Pipe Laying.

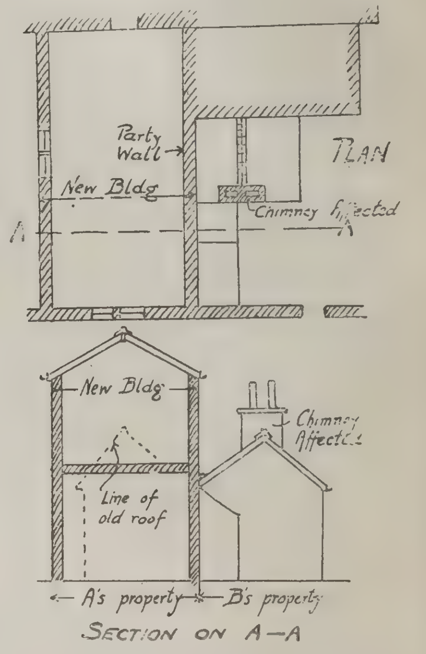
X. writes: "(1) The cost of labour for excavator being 4d. per hour, what is the cost of excavating trenches for laying 6-in., 9-in. and 12-in. pipes in rocky ground, average depth 5ft. 6ins.? (2) Also, what is the cost of laying and jointing 6-in., 9-in., 12-in. and 18-in. iron pipes (caulked lead joints), exclusive of digging?"

Most price-books will give you fullest detailed rates for such work, varying with circumstances. (1) To not exceeding 6ft. deep, from 9d. per cubic yd. of excavation for stony ground to 3s. or more for absolute rock. (2) Provide all tools, lead, yarn, with fixing, laying and pointing, for 6-in., 1s. 1d. per yd. run to perhaps 2s. per 18-in. Your price per hour seems a very low one.

F. S. I.

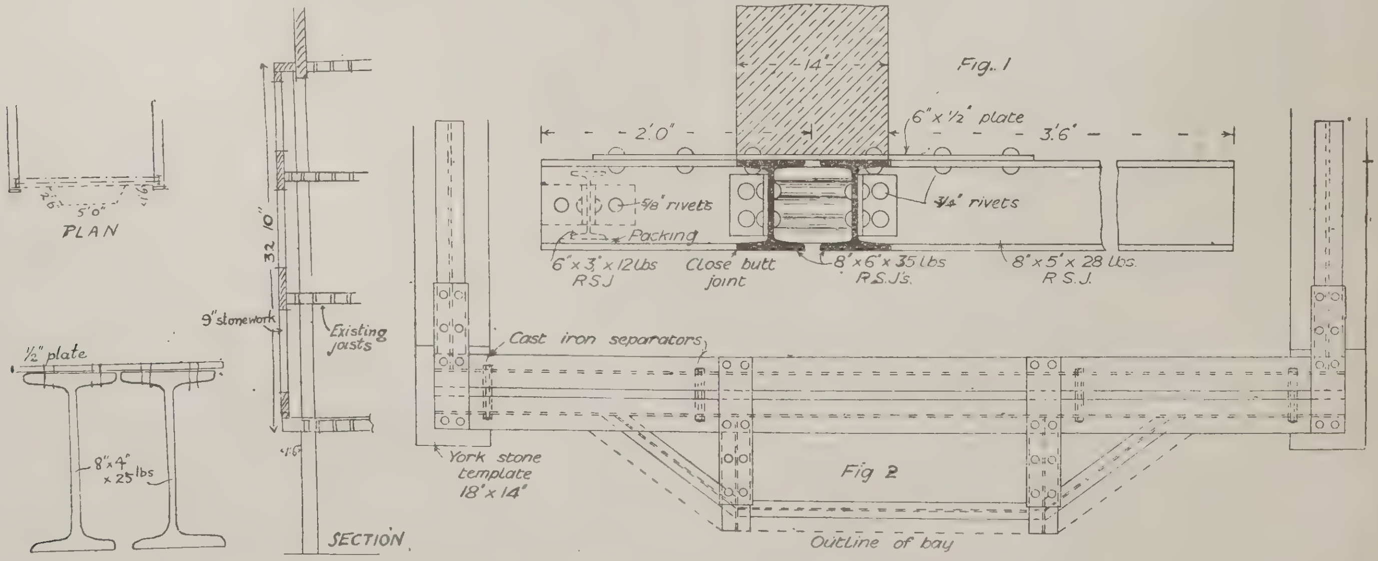
Adjoining Owners and Smoky Chimney.

NEWPORT.—SMOKY writes: "A has altered his back addition as shown on sketch and, in consequence, B's chimney smokes very badly; in fact, a fire cannot be kept in the kitchen range on account of the downdraught, which blows the smoke right into the room. Can B claim damages from A, or can A be compelled to increase the height of B's chimney? You will notice A has no right to overhang his eaves on B's property."



I fear that B has no remedy against A, the latter being within his legal rights in raising his buildings as shown on your sketch. The overhanging eaves are clearly a trespass upon B's property, and probably, with a little judicious management, this may lead to an amicable settlement between the parties.

F. S. I.



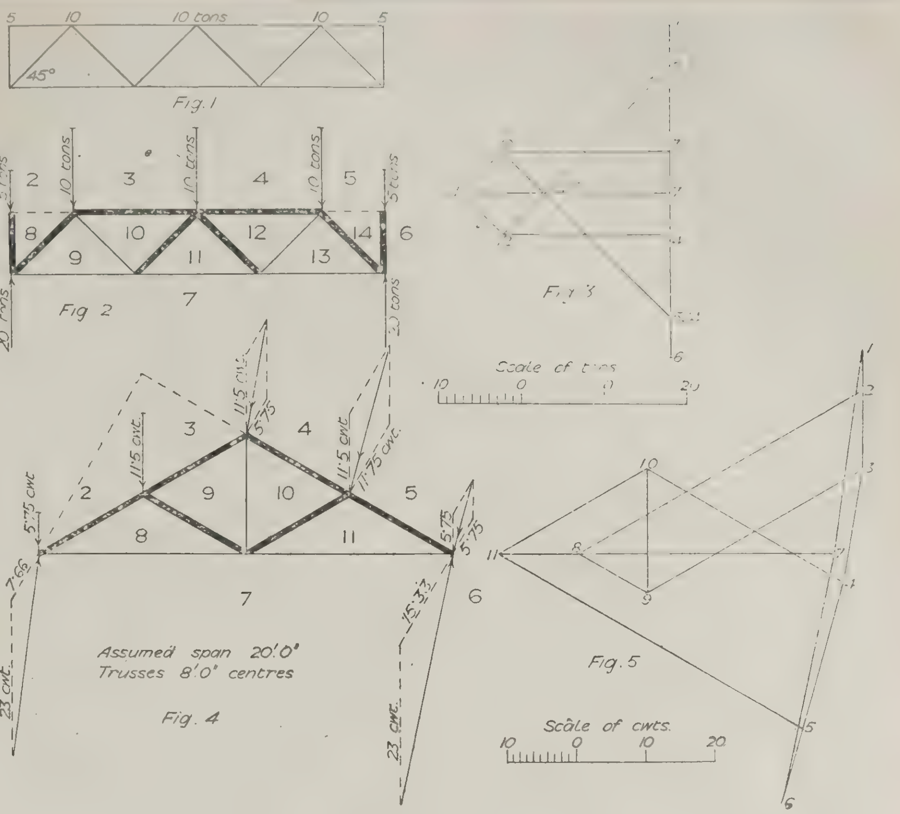
BRESSUMMER GIRDER TO CARRY OVERHANGING BAY.

Freezing of Hot-Water Pipes.

P. writes: "(1) What methods are available to prevent freezing of water in circulating high-pressure system of heating in chapel buildings only in use once a week? (2) What methods should be adopted to release ice when frozen?"

(1) There is nothing better than a small fire in the furnace; and this also has the great advantage of keeping chill out of the building, and enabling full warmth to be attained at the week-end more quickly than when no fire is lit during frost. It takes trouble, and people grumble quite out of proportion at the small amount of extra fuel, but it is by far the best way. When the weather is hovering about frost, get the apparatus to full heat in the middle of the week; and when frost continues keep the furnace a little more than smouldering always. Special liquid in the pipes has the demerit of deposit choking the pipes or corroding them, or of corroding them when the deposit has been scraped out. There are several chemical mixtures, and one by Mr. W. Staunton, heating engineer, London, is well spoken of. Some use common salt, perhaps an ounce to 12lbs. of water, but any brine is corroding. (2) Get a bucket or dish or long trough, and place it under the pipe; and lay on the pipe a piece of sacking or cotton waste or old carpet. Then get a bucket of boiling hot water and ladle it on to the sacking (which is best long enough to have its ends in the empty bucket or dish) until the bucket or trough is full, when you can go to the next place. It may take a dozen buckets to thaw half a yard of small-bore pipe.

INGENIOR.



STATICAL QUESTIONS.

Statical Questions.

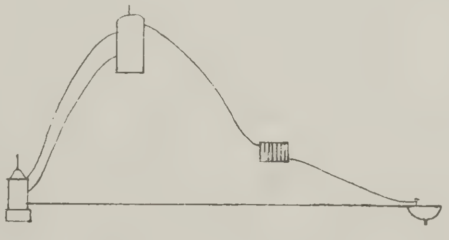
London.—W. K. writes: "(1) Please show the stress diagram for girder as shown by sketch, with stresses on each member. (2) Please also show a diagram of reciprocal forces of a king-post roof truss, 8ft. apart. (3) If a wall were built in London stocks in grey lime mortar of uniform thickness throughout its whole height, what would be the height at which the weight of the wall would constitute a load upon its base as great as would be compatible with permanent safety?"

In reply to the first question, Fig. 1 shows the diagram given, Fig. 2 the frame diagram, and Fig. 3 the stress diagram. If the load is distributed along the top flange there will be a bending moment on all the top members taken as a continuous beam over several supports (see Builders' Journal for November 7th, December 12th, and January 1st last). The weight of the girder itself should also be taken into account. The direct stresses, excluding weight of girder, may be measured from Fig. 3, although the span of girder is not given; the girder having a given number of bays and proportion of depth to length, the stresses are dependent upon the loads only and not upon the span. In reply to the second question, the span of truss is not given, but may be assumed to be 20ft. The weight of truss and covering may be taken at 28lbs. per ft. super. vertically and the wind at 28lbs. per ft. super normal to the roof plane. Fig. 4 shows the frame diagram and Fig. 5 the stress diagram. For simpler approximate solutions see Hardy's "Graphic Statics" (Batsford, 3s. nett). In reply to the third question, the first point to settle is the weight of stock brickwork in grey lime mortar and its working strength. The former may be taken at 1 cwt. per cubic ft. and the latter at 3 tons per sq. ft. Then, omitting wind-pressure and other contingencies, the height to which a wall of uniform thickness could be built to carry its own weight only would be limit the answer to be "combatible with permanent safety," the pressure of the wind, thickness of wall, age of mortar, and other matters must be taken into account.

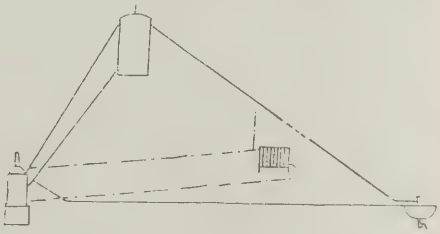
HENRY ADAMS.

Discoloured Hot-Water Supply.

Alloa.—M. writes: "The accompanying diagram shows a hot-water system recently put into a house. The boiler and pipes are copper. The radiator is iron, and the couplings are brass. If the water is allowed to stand in the radiator for a few hours it is drawn off at the cloakroom taps of the colour and consistency of cocoa. There is evidently great corrosion going on inside the radiator. Will this be caused by the quality of the water, or can you suggest any other cause, and a cure?"



The cause may be either the rusting of the iron, which is unlikely; or electro-chemical action by the nature of the water on the iron and copper, or iron and brass; or it may be the impurities that the waterworks filters cannot remove accumulating in the radiator, which is the place where the water is quietest, even when the fire is at its hottest and the circulation at top speed. The last cause is most likely the true one, for the motion of the water in the tubes of a radiator is very slow indeed compared with that in the pipes and boiler. If the town supply be drawn from the river, there will be more impurities (sand, &c., and peat stain) in it at flood times, and if the colour and substance at the wash-bowl are then worse, it is plainly only mud and not an electro-chemical solution. (If you get it analysed, please let us know the result.) The cheapest way to mend the matter is to put in the two new pipes shown by dotted lines on the sketch below, and cut out the piece of existing pipe between to new connections on the present pipe from radiator to bowl.



This may give water quite clean enough. But if the relative levels of basin and boiler are correctly shown on the sketch, the present arrangement is also faulty in making it possible, by a leak at the tap or by accidentally leaving it open, to empty the boiler when the main supply is cut off. And it may be that some mud from the boiler bottom is drawn off by the lavatory tap. The better way to prevent the mud, therefore, is shown in the new sketch. Disconnect the present pipes from the radiator, and join them up by a new piece shown by dotted lines; then disconnect the return at the boiler, the pipe from basin to boiler, and reconnect it to the pipe from cylinder to boiler. Reconnect the radiator with two new pipes of plain iron, one from the main flow pipe from the boiler, and the return one to the bottom of the boiler, as before, and an air-valve or air-escape pipe to the top of the radiator or its supply pipe, if it has not one now. Make the new pipes to the radiator as large as possible—1-in. or 1¼-in. bore at least.

INGENIOR.

Correspondence.

Architects' Fees.

To the Editor of The Builders' Journal.

Sir,—In a recent issue of The Builders' Journal I observed a note to the effect that Mr. J. S. Davy, C.B., chief general inspector and assistant secretary of the Local Government Board, in giving evidence before the Royal Commission on the care of the feeble-minded, is reported to have stated that he considered the system of paying architects 5 per cent. commission on expenditure was radically wrong, and that it was a strong inducement to them to use the best of everything.

This expression of opinion from one holding Mr. Davy's position calls, perhaps, for some consideration. The somewhat cynical light in which Mr. Davy appears to regard the professional morality of the members of the architectural profession is not exactly complimentary. But it has been said—probably with much truth—that there is a good deal of human nature in the world. Certainly when we compare the palatial buildings which have been erected in recent years with those of 30 years ago, we cannot but recognise either that the authorities at that time took a very inadequate view of their duties to the public, or that our buildings are now over-elaborate and needlessly costly. It would not be difficult to point to some buildings which seem unduly sumptuous. But it may be held that this is not due to any obliquity on the part of architects, but rather to a change in public opinion, and, to some extent possibly, to the requirements of the Local Government Board itself.

If there is any ground for Mr. Davy's view, can the commission system be improved upon? Recent events seem to have shown that many architects are not precisely satisfied with the working of the machinery which is supposed to safeguard their interests. Changes are taking place. Others, no doubt, will follow. We may well feel that it would be an excellent thing for architects—and probably for architecture—if it were possible to enlist the sympathies and active co-operation of all those who may reasonably be regarded as belonging to the architectural body, in placing our profession in a more advantageous position in its dealing with the public; that is, for all architectural societies to become one, or affiliated to one central society.

The question of the remuneration of architects cannot fail before long to press for consideration. At present public bodies will not in many cases accept the Institute schedule of fees. In a competition recently advertised by a public body, one of the conditions was to the effect that the signed contract plans and specifications were to remain in the possession of the authority, and that plans of important alterations (if any) and all detail drawings were to be deposited at the offices of the authority on the completion of the works. Five per cent. on the amount of the contract was to cover travelling and all other out-of-pocket expenses: and all this with a member of the R.I.B.A. appointed to adjudicate upon the plans!

Unless the law as to the ownership of drawings is reversed, it would seem imperative that architects should organise with a view to its reversal, or to some revision of the scale of fees to meet the case. Owing to our want of effective organisation, we are at the mercy of any body which desires to make a precedent at our expense.—Yours truly, D.

The R.San.Inst. Certificate for Sanitary Inspectors.

To the Editor of The Builders' Journal.

Sir,—It cannot be too widely known that it is a mere waste of money and time for young men to seek to obtain the certificate of the Royal Sanitary Institute with a view to becoming sanitary inspectors. It is a well-known fact that if every rural and every urban district council in the Kingdom were to seek to replace their present staff of inspectors by men holding this certificate, they could easily do it three times over. At the present time men holding this certificate are offering large sums of money to those interested in such appointments to use their influence on their behalf. And when it is further known that fully three-quarters of such appointments are given to men without any qualification, it will be apparent what a poor chance the certified man has of obtaining an appointment. The examination is very easy to pass. It is not a practical examination. Building construction and sanitary plumbing form a very insignificant part of it. It is open to all comers, whether their former training suits them for such positions or not. In my opinion the pass standard of the examination should be considerably raised. There should be a practical, as well as an oral, examination. Two examinations a year would be ample in view of the large number of men now certified.—Yours truly,

Cert. R.San.Inst.

Building Amenities.

To the Editor of The Builders' Journal.

Sir,—Reading in your columns of an old water main made of the trunk of a tree, I am reminded of an experience some years ago at Old Portsmouth. I had been entrusted by a firm of brewers to take charge of their licensed houses and see to repairs, &c. One day I received a note from them that there was a leak in an old tiled roof, and at once went to see to it, giving instructions to a bricklayer to repair it. When the man was climbing up the roof he suddenly disappeared: he had gone through the roof, then through a ceiling and alighted on a bed in the room below! We then decided to rebuild. A start had scarcely been made when the adjoining house threatened to come over on top of us. The adjoining owner then agreed to rebuild his premises. In the course of this work we found *over* the ceiling joists a half log of elm tree simply hollowed out and still acting as the roof-gutter. There was also found a third of a guinea gold coin, in good preservation. All this work—about £2,000—through trying to repair an old roof!—Yours truly, X.

Fuming Oak.

To the Editor of The Builders' Journal.

Sir,—In the otherwise excellent directions for fuming by liquid ammonia, on p. 77 of your issue for Februay 13th, one important point is overlooked—namely, the room, compartment, or box, besides being air-tight, must also be perfectly dark.—Yours truly,

Exeter. Harry Hems.

Notes and News

For the proposed new Fire Station at Birmingham a site at the corner of Legge Lane and Albert Street has been selected.

Merchants' House Buildings, Glasgow.—A scheme for the reconstruction of these buildings has been drawn out and approved. Messrs. John Burnet & Son are the architects for the work.

The Photographic Survey of Sussex.—The photographs, negatives, lantern slides, &c., contributed to this survey have been transferred to the public library in Church Street, Brighton, where they will be open to public inspection on week-days from 10 a.m. to 10 p.m. Photographs now total 747, negatives about 1,100, and lantern slides 300.

Agricultural Hall Extension.—It is proposed to extend the present minor hall of the Royal Agricultural Hall, Islington, to a size equal to half that of the great hall. The minor hall now measures 78ft. in length and 152ft. in width, and the extension will add 150ft. to the length. The building will be of stone and brick, while the roof will have three iron and glass spans. The cost of the work is estimated at £30,000.

The Tympanum of Westminster Cathedral.—Active steps are being taken by the Westminster Cathedral authorities to bring about the completion of the main entrance by the filling of the great tympanum with mosaic. The design has been prepared by Mr. John A. Marshall, of Messrs. Bentley & Sons, and it embodies the suggestions made by the late Mr. Bentley before his death. It is expected that the work will be executed during the present year.

Glasgow's Scheme of District Libraries has been carried still further to completion by the opening of the library at Pollokshields. The architect was Mr. Thomas G. Gilmour, of the city engineer's staff. The library provides a general newsroom 58ft. by 27ft., accommodating 80 readers; a ladies' room 24ft. by 18ft., accommodating 30 readers; a lending library 49ft. by 27ft.; with two reading-rooms on the upper floor—one for 72 boys and the other for 36 girls. The cost of the building has been about £5,000.

Three Burne-Jones Tapestries have been presented to the Birmingham City Art Gallery. The tapestries form part of a series representing the Quest of the Holy Grail, and were executed on the hand looms of Messrs. Morris & Co., at Merton Abbey. The largest is 20ft. by 8ft. Like all those produced on the Morris looms, they are of high warp, corresponding with the work of the ancient Gobelins in Paris, and nearly akin to it in finish and execution. The making of arras tapestry was practically a lost art until William Morris found out, with the aid of a model loom and an old French book, how it should be done. He then taught some of his pupils the process, and built full-size looms in the factory which he started at Merton. There the work has thriven well, and is continually improving in quality. For the past three years the looms have been engaged on a large design called "The Passing of Venus," which was the last work touched by Burne-Jones before his death. Recently they have produced the beautiful tapestries which fill the east end and the space over the altar of Eton Chapel.

Composition Slate.— Messrs. Calmon Asbestos Slate Co. have appointed Messrs. Lytle & Pollock, of Dumbar Street, Belfast, as their Irish agents, and Messrs. W. H. Herbert & Co., of 15, Temple Street, Swansea, as their agents for South Wales.

Serious Condition of Winchester Cathedral—The gravity of the mischief in the north transept and north aisle has been confirmed. The fillets which last autumn were placed across the cracks which have occurred in two places in the north aisle, about the third bay from the west end, and embracing two buttresses and the space between, are certainly giving indications of persistent movement—all show signs of fractures which continue right through the thickness of the wall. This may entail the necessity of underpinning a portion of the north aisle, and strengthening in some way by augmenting the flying buttresses, or by steel ties above the vaulting, to counteract the undue thrust which appears to exist in the nave vaulting. It has also been determined to underpin the whole of the Norman wall of the north transept, and hoardings are being erected to enclose the space which will be occupied while the work is in progress.

The City Churches.—In discussing the City spires in "The Shilling Burlington," Mr. Lawrence Weaver, F.S.A., writes: "St. Paul's is still the supreme feature of the City; but commerce is crowding out the parish churches. Seen from the Temple, Cannon Street Station is a hideous incubus on the City sky-line. It blots out all the Monument except from the gallery upwards (not a great loss, perhaps) and every spire, save the tip of St. Magnus, while the bridges at Blackfriars cut out the foreground. The City of London School on the left, with its lead lantern of irritating and trivial outline, almost wholly hides St. Paul's. The miserable spikes on the corners of Cannon Street Station add insult to injury, for they are, in outline, vulgar caricatures of the steeple of St. Magnus. Once past Blackfriars Bridge, the ten-storeyed warehouses of Thames Street make a wall impenetrable."

St. Ann's Church, Manchester.— There has been some correspondence in the "Manchester Guardian" in reference to the identity of the architect of this church. One correspondent quotes the tradition that the architect was Wren. Mr. John Swarbrick writes pointing out, however, that there is no documentary proof of such an assertion, although it is of course well known that the church was erected between 1709 and 1712, during Wren's lifetime. The chief followers of Wren were Hawksmoor, John James of Greenwich (formerly master-carpenter and assistant surveyor at St. Paul's Cathedral, and afterwards architect of St. George's, Hanover Square), Thomas White of Worcester, and Christopher Kempster, the master-mason who probably designed the beautiful town hall at Abingdon. Mr. Swarbrick, however, after making a careful examination, does not think that any of these was responsible for St. Ann's Church, Manchester, though the influence prevailing the design was undoubtedly due to Wren's work. Perhaps at Manchester, as elsewhere, an able man of the Wren school may have practised and yet passed away without any record of his name having been kept.

Northern Architectural Association.—Mr. J. T. Cackett's recent presidential address to this Association has been republished in pamphlet form. Included in it is a large plan showing Mr. Cackett's suggested scheme of improvements in connection with Market Street extension, Newcastle-on-Tyne.

Steel for Buildings: New Works for Lancashire.—It is stated that a company is in course of formation with a view of establishing a large new steel works in Lancashire. It is not yet definitely decided whether the works will be erected in the Bolton district or at Trafford Park, but it is believed that the latter place will be selected. At present most of the constructional iron work used in the new cotton mills now being erected in Lancashire is imported from Belgium, and it is the intention of the promoters of the new undertaking to put down plant so as to be able to meet the requirements of constructional engineers in this part of the country.

Coming Events.

Wednesday, April 3.

Edinburgh Architectural Association (Associates' Paper).—Mr. A. Lindsay on "Notes on Building Practice," at 8 p.m.

Saturday, April 6.

Opening of the Building Trades' Exhibition.

Monday, April 8.

Royal Institute of British Architects.—Mr. Stanley Hamp, A.R.I.B.A., on "Hotels," at 8 p.m.

Bristol Society of Architects.—President's Conversazione.

Royal Sanitary Institute.—Mr. A. Saxon Snell, F.R.I.B.A., on "Ventilation, Warming and Lighting," at 7 p.m.

Surveyors' Institution.—Mr. W. Vaux Graham and Mr. Harold F. Bidder, on "Underground Water: a Discussion of Certain Recent Enactments Affecting Water Rights," at 8 p.m.

Tuesday, April 9.

Society of Designers.—Mr. H. Inigo Triggs, A.R.I.B.A., on "Garden Design in Italy," at 8 p.m.

Architectural Association of Ireland.—Mr. E. Bradbury, M.R.I.A.I., on "The Northamptonshire Excursion."

Institution of Civil Engineers.—Mr. Moses Kellow, A.M.I.C.E., on "The Application of Hydro-Electric Power to Slate Mining"; and Mr. Arthur Henry Preece, M.I.C.E., on "Electrically-driven Winding Gear and the Supply of Power to Mines," at 8 p.m.

Bankruptcies.

A. J. Nichols, builder, Southgate. R.O., March 23.

H. Baxter, builder and contractor, Mansfield. R.O., March 19.

T. C. Mansfield, plumber and painter, Church Gresley. R.O., March 19.

W. Hopwood, builder and contractor, St. Anne's-on-Sea. Discharge granted, but suspended for four years.

J. Tyson, builder, Gosforth. Gross liabilities, £1,363; £600 expected to rank for dividend; assets, £252; deficiency, £348.

S. J. Mills, brick manufacturer, Pensnett. First meeting, O.R.'s, Dudley, April 8, at 11. P.E., Stourbridge C.C., April 17, at 2.

Walmsley & Co., painters and decorators. First meeting, O.R.'s, Preston, April 3, at 11.30. P.E., Sessions Hall, Preston, April 12, at 11.

Burley Brothers, builders, Waverton. First meeting, Crypt Chambers, Chester, April 3, at 12. P.E., The Castle, Chester, April 30, at 11.

J. V. Sleight, builder Great Grimsby. First meeting, O.R.'s, Great Grimsby, April 3, at 11. P.E., Town Hall, Great Grimsby, April 4, at 11.

P. A. Ryland, builder, Southampton. First meeting, O.R.'s, Southampton, April 4, at 11.30. P.E., Southampton C.C., April 24, at 12. R.O., March 21.

Smith & Co., plumber, painter and decorator, Swindon. First meeting, O.R.'s, Swindon, April 3, at 11.15. P.E., Swindon C.C., April 24, at 2.30. R.O., March 18.

J. Jefferis, plumber, Bournemouth. First meeting, Curtis & Sons, 158, Old Christ Church Road, Bournemouth, April 3, at 3.30. P.E., Town Hall, Poole, April 10, at 11.30. R.O., March 19.

Metcalf & Greig, architects and surveyors, London. First meeting, Bankruptcy Court, March 27, at 11. P.E., same, April 26, at 11.30. R.O., Feb. 6.

Hening & Morgan, builders, Shotton. First meeting, Crypt Chambers, Chester, March 27, at 12. P.E., The Castle, Chester, April 30, at 11. R.O., March 11.

Our Plates

In continuation of the series on Fontainebleau, we publish this week a measured drawing of a refined piece of interior woodwork design—namely, the main entrance door to the Chapel of the Trinity with gallery over.

The selected competition plans for the Galway Fever Hospital are dealt with in a special article on this page.

The plan of the arrangement of the stands at the Building Trades' Exhibition at Olympia, which will open this week, provides information in itself and will be found useful in connection with the notes on a number of the exhibits in the "Contractors' Supplement."

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
April	30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May	11	SCOTTISH NATIONAL EXHIBITION AT EDINBURGH.— Premiums of £100 and £75. Conditions from J. Marchbank, 45 York Place, Edinburgh, Deposit, One guinea.
May	17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June	1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug.	27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
No date.		HIGHLAND MANSES AND CHURCH BUILDINGS for United Free Church of Scotland. Conditions from J. T. S. Watson, 1, Castle Terrace, Edinburgh. Deposit, Two guineas.

GALWAY FEVER HOSPITAL COMPETITION.

On the centre plate in this issue we publish the plans of the design placed first in this competition. Twenty-eight sets of plans were sent in from various parts of the United Kingdom, these having been adjudicated upon by Mr. G. C. Ashlin, F.R.I.B.A., R.H.A., of Dublin. The author of the design we illustrate, Mr. Alfred Cowlishaw, of Galway (who has since been appointed to carry out the work), adopted a two-storey building. The site being somewhat restricted, and a portion of it lying rather low, the object aimed at was isolation combined with efficient and economical administration. It may be noted that patients can be admitted to the wards without passing through the administration block, and the covered ways form convenient shelter to patients entering the general wards. The accommodation provided is somewhat in excess of the amount given in the particulars. A convalescent room is shown on the first floor of each main wing: these are very desirable, especially for the patients in the upper wards, who otherwise would obtain no change of room or air until well advanced towards recovery; moreover, these rooms would facilitate recovery, and also provide valuable extra space in the event of an exceptional epidemic. Accommodation is also shown for a matron's room and office, waiting

No. 3 Quarry, Bramcragg.

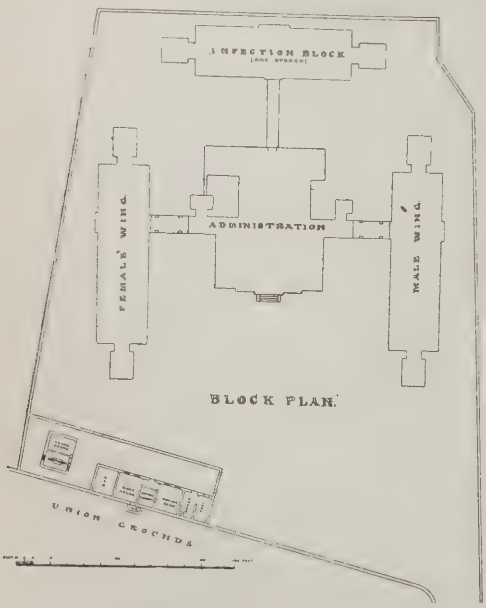
General view of Quarry and Offices.

GRANITE QUARRIES AT THRELKELD, CUMBERLAND.

room, and doctors' or committee room and dispensary. It is proposed to warm the wards by double open-fire hospital stoves of Shorland's type, supplemented, in the large wards, by hot-water low-pressure radiators. The corridors are also to be warmed by radiators. The heating apparatus will be placed in the basement under the dispensary, scullery, &c. For ventilation, in addition to the warmed fresh air through the stoves, inlets will be provided near the floor level under the beds, and outlet flues from near the ceiling, connected to the exhaust ventilators on the roofs. The stoves in the large wards are shown to have their flues in a central stack, where additional outlet flues will be provided.

The walls are to be built of granite rubble, to be obtained from new granite quarries opened in the neighbourhood. Roofs are to be slated, all floors formed of concrete finished with boards bedded in composition.

The estimated cost of the buildings as shown is £13,500, but we understand that the Guardians are not prepared to spend so much, and it is proposed to omit the infection block for the present and to reduce the administration block. There was no stipulated sum named in the advertisement of the competition nor in the particulars of accommodation supplied.



GALWAY FEVER HOSPITAL: SELECTED DESIGN.
ALFRED COWLISHAW, ARCHITECT.

New London Buildings

At last week's meeting of the London County Council, the Building Acts Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics* :—

Buildings on the northern side of Webber Street, Southwark, to abut also upon the eastern side of Valentine Place, on the application of W. Egerton, on behalf of the Maltina Company. (*Consent.*)

Projecting shop front on the King Street frontage of a proposed addition to Nos. 95 and 97, Kensington High Street, on the application of P. E. Pilditch, on behalf of J. Barker and Co., Ltd. (*Consent.*)

Five houses on the western side of Old Town, Clapham, southward of Lydon Road, on the application of A. P. Lambert, on behalf of H. G. Blackmore. (*Consent.*)

One-storey shop in front of No. 254, King Street, Hammersmith, on the application of G. Trotman, on behalf of Kennedy & Clarke. (*Consent.*)

Addition to a porch in front of No. 13, Arkwright Road, Hampstead, on the application of J. D. Hunter, on behalf of E. Sondheim. (*Consent.*)

Enclosures to the sides of a porch in front of No. 62, Porchester Terrace, Paddington, on the application of Gale, Gotch & Leighton, on behalf of H. W. Brooks. (*Consent.*)

Buildings on the southern side of Ilderton Road, Rotherhithe, with the western flank to abut upon the eastern side of Bramcote Road, on the further application of J. T. Bressey & Son, on behalf of Mrs. E. S. Wellby. (*Consent.*)

Balconettes in front of No. 1, Clarges Street, Piccadilly, on the application of Blow & Martin. (*Consent.*)

Porch in front of No. 10, St. James Street, Strand, and the erection of enclosures to a portico on the flank frontage of such building in King Street, on the application of E. Runtz & Ford. (*Consent.*)

Addition to Nos. 2 and 2A, Blomfield Villas, Blomfield Road, Hammersmith, on the application of Macintosh & Newman, on behalf of E. J. Clayton. (*Refusal.*)

Buildings on the south-western side of Finchley Road, Hampstead, northward of Fairfax Road, on the application of R. L. Pearce, on behalf of the Middlesex Building Company. (*Refusal.*)

Addition at the rear of No. 338, Holloway Road, Islington, to abut upon the north-western side of Loraine Road, on the application of J. Wallis Chapman, on behalf of Jones Brothers (Holloway), Ltd. (*Refusal.*)

Shop front in front of Nos. 63 and 65, Engleheart Road, Catford, on the application of W. Stewart, on behalf of Mann, Crossman & Paulin, Ltd. (*Refusal.*)

One-storey shop in front of No. 346, High Street, Lewisham, on the application of W. Goddard & Co., on behalf of G. E. Beaumont. (*Refusal.*)

Iron and glass shelter at the rear of No. 1, Albany Street, St. Marylebone, to extend over Albany Mews, on the application of Brown & Barrow, on behalf of Friswell, Ltd. (*Refusal.*)

Addition to the Rotherhithe Amicable Society's school, on the north-western side of Adam's Gardens, Rotherhithe, on the application of R. Page, on behalf of the Trustees of the school. (*Consent.*)

Three houses on the southern side of Iron Mill Place, Garrett Lane, Wandsworth, on the application of F. Rashbrook, on behalf of the Trustees of the late David Mitchell and himself. (*Consent.*)

Building on the southern side of George's Road, Islington, to abut also upon the eastern side of Adam's Place, on the application of G. H. Lovegrove, on behalf of J. Pinchbeck. (*Consent.*)

Rebuilding of No. 53, Bryanston Street, St. Marylebone, on the application of Hudson & Hunt, on behalf of the Church Army. (*Consent.*)

Two houses on the western side of West Hill Road, Wandsworth, on the application of E. King. (*Consent.*)

Addition at the rear of No. 2, Brechin Place, Westminster, on the application of Carter & Wise, on behalf of W. O. Danckwerts. (*Consent.*)

Three-storey building on the northern side of Ronald's Road, Highbury, flanking also upon the western side of a mews leading out of the northern side of Ronald's Road, on the further application of H. J. White, on behalf of A. E. Bailey. (*Refusal.*)

Projecting one-storey addition in front of No. 3, Newcombe Street, Kensington, on the application of E. W. Fagg, on behalf of Professor F. T. G. Hobday. (*Refusal.*)

Building on the Northern side of Glenthorne Road, Hammersmith, eastward of Dalling Road, with a projecting oriel window on the flank, in connection with the application of A. W. Hudson, on behalf of Gruntwag & Morton. (*Consent.*)

Projecting one-storey porches in front of eleven houses on the south-western side of Holmdene Avenue, Dulwich, and four of such houses with irregular open spaces at the rear, on the application of H. Wakeford & Sons, on behalf of J. & R. Bax. (*Consent.*)

Houses in Azenby Square, Camberwell, on the application of G. P. Pratt, on behalf of A. Aldridge. (*Refusal.*)

A LAKE DISTRICT QUARRY.

Doubtless many of our readers have taken their holiday, at some time or other, in the English lake district, and very probably they have noticed that the face of the hill on the left as they approach Threlkeld station is scarred by quarry workings. This quarry, originally opened in 1880 by Messrs. Harkewitz & Bullen, is now the property of the Threlkeld Granite Co., Ltd. The original staple of the quarry was road-metal granite, though building granite was also produced from it, but in 1897, after long experimenting, it was found possible to use the waste products in the manufacture of granite tiles, produced in colour. The waste product had long been made into flags of artificial stone, and these are very largely used in most of the principal cities in Great Britain. The granite tiles in colour, however, were a new departure. The machinery was brought from Germany, and the German patents were also bought, so that here in this Cumberland quarry is an industry actually brought from, instead of going to, Germany. The granite of Threlkeld is tough, uniform in wear, and has a crushing strain of 2,497 lbs. to the sq. ft., which is higher than most granites used as macadam. The setts have been used in the North for the last twenty years, and have proved very durable and non-slipping. The quarry work is very largely carried out by compressed-air machinery, in which the present managing director, Mr. George H. Bragg, has great faith.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Clover, best...	per load	4	7	0	4	17	6
Hay, good	do.	4	0	0	4	5	0
Sainfoin mixture	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

MISCELLANEOUS.

		£	s.	d.	£	s.	d.
Bricks Stocks, d/d to job	per 1,000	1	16	0	—		
Do. Flettons on rail ...	do.	1	6	0	—		
Do. Pressed Wire Cuts, d/d to job ...	do.	1	18	0	—		
Do. Blue brindled wire cuts	do.	1	3	0	—		
Do. do. wire cuts ...	do.	1	7	0	—		
Do. do. pressed facings	do.	1	18	0	—		
Coke Breeze, into carts at gasworks ...	per load	0	2	0	—		
Do. d/d to job	do.	0	4	0	—		
Sand	per yard	0	7	6	—		
Ballast	do.	0	6	6	—		
Cement	per ton	1	13	0	—		
Lime	do.	1	4	0	—		
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds	per sq. ft.	0	0	3½	—		
Do. do. do. do. 3rds.	do.	0	0	2½	—		
Do. do. do. 21oz., 2nds.	do.	0	0	5	—		
Do. do. do. do. 3rds	do.	0	0	3½	—		
Do. do. do. 26oz., 2nds	do.	0	0	6	—		
Do. do. do. do. 3rds	do.	0	0	4¼	—		
Do. do. do. 32oz., 2nds	do.	0	0	8	—		
Do. do. do do. 3rds	do.	0	0	6	—		
Do. English patent plain rolled plate in stock crates ⅛	do.	0	0	2	—		
Do. do. do. 3/16	do.	0	0	2¼	—		
Do. do. do. ¼	do.	0	0	2½	—		
Granite Chippings ...	do.	0	10	6	—		
Do. do. ¾in. ...	do.	0	11	6	—		
Do. Broken, 1½in. ...	do.	0	15	6	—		
Do. do. 2in. ...	do.	0	15	0	—		
Do. do. 2½in. ...	do.	0	14	6	—		
Do. Kerb, Norwegian 6×12 and 12×6 in river	per foot	0	1	2	—		
Do. do. do. circular	do.	0	1	5	—		
Do. do. do. 12×8 in river	do.	0	1	5	—		
Do. do. do. circular	do.	0	1	8	—		
Do. do. Guernsey 6×12 in river	do.	0	1	4	—		
Do. do. do. circular	do.	0	1	6	—		
Do. do. do. Specia 4×6	do.	1	11	0	—		
Do. do. Guernsey, 3×6	do.	1	10	0	—		
Do. do. do. 3×7 & 3×9	do.	1	8	6	—		
Do. do. do. 3×5	do.	1	10	0	—		
Castor Oil, French ...	per cwt.	1	9	0	—		
Colza Oil, English ...	do.	1	11	9	—		
Copperas	per ton	2	0	0	—		
Lard Oil	per cwt.	2	15	0	2	17	0
Lead, white, ground, carbonate	per ton	16	0	0	—		
Do. red	do.	15	0	0	19	0	0
Linseed Oil, barrels ...	per cwt.	1	2	3	—		
Petroleum, American ...	per gal.	0	0	6¾	0	0	6⅞
Do. Russian ...	do.	0	0	6¼	0	0	6⅝
Pitch	per barrel	0	12	0	0	13	0
Shellac, orange	per cwt.	10	13	0	10	14	0
Soda, crystals	per ton	3	2	6	3	5	0
Tallow, Town	per cwt.	1	15	0	1	15	6
Tar, Stockholm	per barrel	1	5	0	—		
Turpentine	per cwt.	2	10	9	—		

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	107	0	0	108	0	0
Do. Strong sheets ...	do.	124	0	0	125	0	0
Lead, soft foreign	do.	19	13	6	19	15	0
Do. English	do.	19	15	0	20	0	0
Do. pipes...	do.	23	5	0	23	7	6
Do. sheets	do.	22	13	6	22	15	0
Galvanised Corrugated sheets	do.	13	15	0	14	0	0
Spelter G. M.	do.	26	5	0	26	7	6
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	7	15	0	7	17	6
Marked bars, Staffs. ...	do.	9	0	0	9	2	6
Common bars, do. ...	do.	7	5	0	7	10	0
Angles, M'boro.	do.	7	2	6	7	5	0
Joists do.	do.	7	0	0	7	2	6
Angles, Midlands	do.	6	15	0	6	17	6
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	187	0	0	188	0	0
Do. English ingots ...	do.	191	0	0	192	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

Soft Woods.

		£	s.	d.	£	s.	d.
Fir, Dantzic and Memel	per load	3	10	0	5	0	0
Pine, Quebec, Yellow ...	do	3	12	6	6	5	0
Do Pitch, American ...	do	4	7	6	5	0	0
Laths, log, Dantzic	per cu. fath	4	0	0	6	0	0
Do Altappen & Gran-							
Do Kemi, Yellow,							
Beams	per qr.	1	11	0	1	14	0
Deals, Abo., Yellow, unsorted, 3×4	per std.	9	0	0	9	5	0
Do. do. do. do. 2½×7	do.	9	0	0	9	5	0
Do. Archangel, Yellow, 2nd, 3×9	do.	14	15	0	15	10	0
Do. do. do. 3rd, 3×9	do.	9	0	0	9	5	0
Do. do. do. do. 3×8	do.	10	5	0	—		
Do. do. do. 4th, 4×11	do.	10	5	0	—		
Do. do. do. do. 3×9	do.	10	0	0	—		
Do. do. do. 5th, 3×11	do.	8	0	0	—		
Do. do. do. do. 3×9	do.	8	0	0	—		
Do. do. White, 2nd, 3×11	do.	12	10	0	12	15	0
Do. do. do. do. 3×9	do.	9	10	0	10	0	0
Do. Aryd, Yellow, unsorted, 2½×7	do.	9	0	0	—		
Do. Borga. do. do. 3×5½	do.	9	0	0	—		
Do. Constantza, White, 2nd, 3×11	do.	10	5	0	—		
Do. do. do. 3rd, 3×9	do.	8	5	0	—		
Do. Hernosard, Yellow, 4th, 3×9	do.	9	15	0	—		
Do. do. do. Inf., 5th, 3×9	do.	8	0	0	—		
Do. Halifax, White, unsorted, 3×7	do.	7	15	0	—		
Do. Keret, Yellow, 3rd, 3×9	do.	10	5	0	—		
Do. Montreal, Bright Pine, 1st, 3×10	do.	24	10	0	—		
Do. do. do. do. 3×7	do.	22	0	0	—		
Do. do. Bright Spruce, 2nd, 3×9	do.	9	5	0	—		
Do. Mesane, White, 1st, 3×9	do.	11	15	0	—		
Do. do. Yellow, 3rd, 3×9	do.	10	15	0	—		
Do. Nederkalix, Yellow, 1st, 4×9	do.	11	10	0	—		
Do. do. do. do. 3×9	do.	11	5	0	—		
Do. do. do. do. 2½×7	do.	10	15	0	—		
Do. Norrkoping do., 1st & 2nd, 2½×7	do.	9	10	0	—		
Do. Quebec, Spruce, 1st, 3×8	do.	12	0	0	—		
Do. St. John, Bright Spruce, 1st, 2nd & 3rd, 3×9	do.	8	10	0	—		
Do. do. do. do. 3×7	do.	7	15	0	—		
Do. Soroka, Yellow, 1st, 3×9	do.	20	0	0	—		
Battens, Abo., Yellow, unsorted, 2×6	do.	8	15	0	—		
Do. do. do. do. 2×5	do.	8	5	0	8	10	0
Do. Archangel, Yellow, 2nd, 2×9	do.	15	0	0	15	5	0
Do. Borga, Yellow, unsorted, 2½×6	do.	7	15	0	—		
Do. Blankaholm, Yellow, 1st, 2×7	do.	9	10	0	—		
Do. Kooda, Yellow, 3rd, 2×9	do.	11	0	0	—		
Do. Sappvik, Yellow, unsorted, 2×5	do.	8	10	0	8	15	0
Do. Langrov, Yellow, unsorted, 2×6	do.	9	10	0	9	15	0
Do. Lovisa, Yellow, unsorted, 2×9	do.	9	15	0	—		
Do. do. do. do. 2×6	do.	8	15	0	—		
Do. Norrkoping, Yellow, 1st & 2nd, 2×7	do.	9	5	0	—		
Do. Nordmaling, Yellow, 5th, 2½×6½	do.	5	15	0	—		
Do. Skelleftea, white, unsorted, 2×5	do.	7	0	0	—		
Flooring Boards, Fredriksstad, Yellow, 3rd, 1×7	do.	0	10	0	—		
Do. do., Yellow and White, 1×7	do.	0	8	0	—		
Do., Gefle, Yellow, 2nd, 1¼×7	do.	0	13	0	—		
Do., do., do., 1¼×6	do.	0	13	9	—		
Do. do., do., 2nd. 1×7	do.	0	11	3	0	12	0
Do. Mo, yellow, 2nd, 1×7	do.	0	11	9	—		
Do., do., do., 3rd, 1×7	do.	0	10	6	—		

Hard Woods.

		£	s.	d.	£	s.	d.
Ash, Quebec	per load	4	2	6	7	5	0
Birch, New Brunswick ...	do.	2	7	6	5	0	0
Do. Quebec	do.	2	7	6	5	0	0
Cedar, Cuba	per ft. sup.	0	0	4	0	0	5
Do. Honduras	do.	0	0	4	0	0	5

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Letchworth (Herts).—For the erection of an electric power station building, for the First Garden City, Limited:—

S. Redhouse	£1,168	0	0
G. Thompson & Co.	1,166	11	5
E. Wood & Co.	1,110	0	0
H. E. Hurst	1,034	0	0
Davies, Ball & Co.*	1,020	19	0

Engineer's estimate, £1,070.

* Accepted.

Leyburn (Yorks).—For providing and laying about 200 lin. yds. 12-in. earthenware pipe sewers, 2,400 lin. yds. 9-in. earthenware cast iron pipe sewers, 200 lin. yds. 6-in. earthenware pipe sewers, together with manholes, etc., for the R.D.C. Messrs. Spinks & Pilling, engineers, 20, Park Row, Leeds:—

A. E. Hobbs, Stockton	£3,451	3	1
J. H. Macdonald, Oxford ...	3,353	0	0
G. Freeman & Sons, Oldham ...	3,337	0	0
Schofield & Sons, Leeds ...	3,332	4	1
J. Fowler, Darlington	3,276	7	10
M. Arundal, East Ardsley ...	3,246	5	6
T. Doughill & Sons, Aysgarth	3,125	2	6
B. Firth & Co., York	2,976	16	8
G. R. Wade, Richmond	2,919	12	6
W. H. Parkin & Co., Horsforth	2,881	1	6
C. Bushby & Sons,* Leeds	2,776	0	0

* Accepted.

Newport (Mon).—For the erection of new Congregational church in London Street, Maindee. Habershon, Fawckner & Co., architects, 41, High Street, Newport:—

D. J. Davies	£3,759	0	0
J. B. Jenkyn	3,747	0	0
W. Moore	3,700	0	0
C. H. Reed	3,700	0	0
J. Jenkins, Ltd.	3,666	0	0
C. F. Leadbeter	579	10	0
R. W. Moon	3,560	0	0
W. A. Linton	3,530	0	0
J. H. Leadbeter	3,525	0	0
J. J. Partridge	3,475	0	0
J. Brownscombe & Son	3,469	0	0
J. Matthias	3,402	0	0
J. Charles	3,400	0	0
J. H. Williams	3,300	0	0
W. Jewell & Sons	3,250	0	0
W. R. Pitt	3,230	0	0
A. S. Morgan & Co.	3,220	0	0
W. E. Blake, Plymouth	3,180	0	0
W. King & Son, London	3,176	0	0
Poulton & Whiting, Pontnewydd	3,169	0	0
Jerrett & Fisher	3,100	0	0
C. Shopland*	3,098	0	0

* Accepted. Rest of Newport.

Newport (Mon).—For the erection of new premises in High Street, for Mr. W. Burt. Messrs. Habershon, Fawckner & Co., architects, 41, High Street, Newport, and Cardiff:—

J. Brownscombe & Son	£2,150
W. M. Blackburn	2,145
A. S. Morgan & Co.	2,110
W. Moore	2,100
W. Jewell & Sons	2,038
C. H. Reed	2,027
W. A. Linton	2,000
C. Shopland	1,999
R. W. Moon*	1,998
J. Charles	1,995
Smith Bros.	1,950
J. H. Williams	1,949

* Accepted.

Warminster.—For the erection of additions to the Buries, for Mr. Gratney R. Z. Erskine. Messrs. Long & Glass, architects, 53, Market Place, Warminster:—

J. Long & Sons, Bath	£1,840	0	0
F. J. Amery, Bath	1,769	0	0
Downing & Rudman, Chippenham	1,760	0	0
F. Curtis & Son, Warminster...	1,719	0	0
G. Moore, Trowbridge	1,705	0	0
Parsons Bros., Westbury ...	1,627	10	0
W. Moody, Trowbridge	1,600	0	0
A. J. Colborne, Swindon	1,588	10	0
A. L. Ponton, Warminster ...	1,560	0	0
E. Linzey, Trowbridge	1,470	0	0
R. Butcher & Son,* Warminster	1,377	14	0

* Accepted.

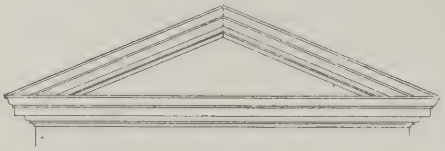
Timber Trade: The London Market: Abstract of Stock, Consumption, etc., for FEBRUARY.

All Docks.	Deals (Fir).	Battens (Fir).	Pine.	Spruce.	Pitch Pine Deals.	Deals & Battens. In aggregate.	Rough Boards. (All Countries).	Flooring.	Floated Timber.
1907. Public Dock stock ...	1,614,163 pcs.	3,407,848 pcs.	668,328 pcs.	960,789 pcs.	56,070 pcs.	6,707,198 pcs.	4,021,371 pcs.	6,554,748 pcs.	24,000 lds.
Monthly ,, ,, consumption	246,615 ,,	455,856 ,,	71,814 ,,	97,801 ,,	9,157 ,,	881,243 ,,	420,405 ,,	991,701 ,,	3,264 ,,
Overside stock	461,170 ,,	852,451 ,,	134,292 ,,	182,888 ,,	—	1,630,801 ,,	786,157 ,,	485,933 ,,	—
Overside consumption (estimated of dock) 111% Sawn 60 ,, Planed	273,743 ,,	506,000 ,,	79,714 ,,	108,559 ,,	—	968,016 ,,	466,650 ,,	595,021 ,,	—
Duration of supply at same rate of consumption	3·99 months	4·43 months	5·30 months	5·54 months	6·12 months	4·51 months	5·42 months	4·44 months	7·35 months

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Ninth Series.)

CLASS A (ARCHITECTURE).



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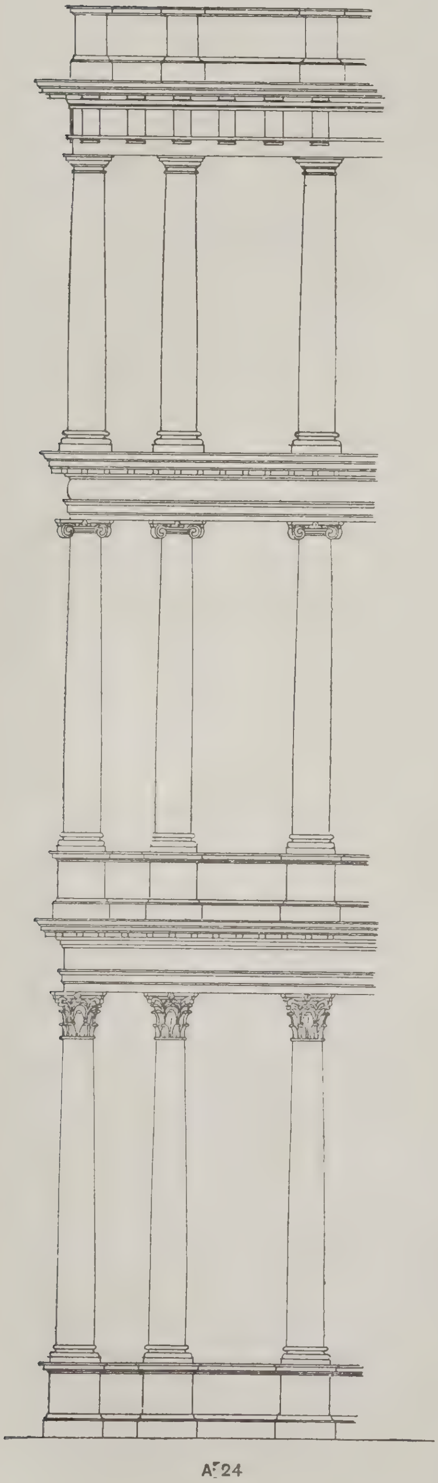


A 24

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

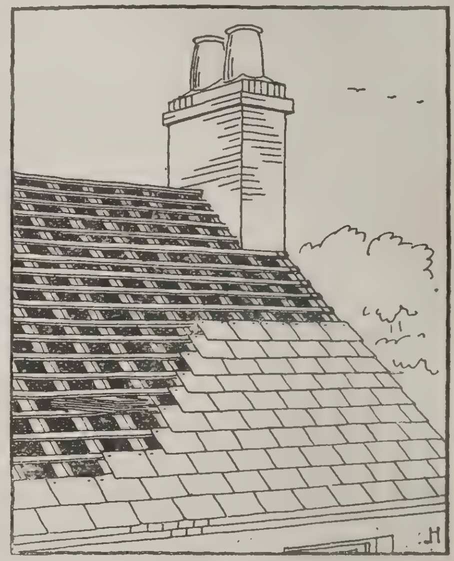
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

(*For Coupons see page xxxii.*)

Copies of "THE BUILDERS' JOURNAL" *containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

CLASS B (BUILDING).



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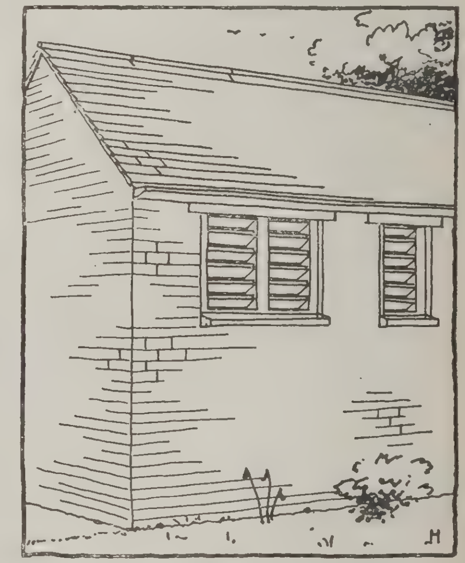

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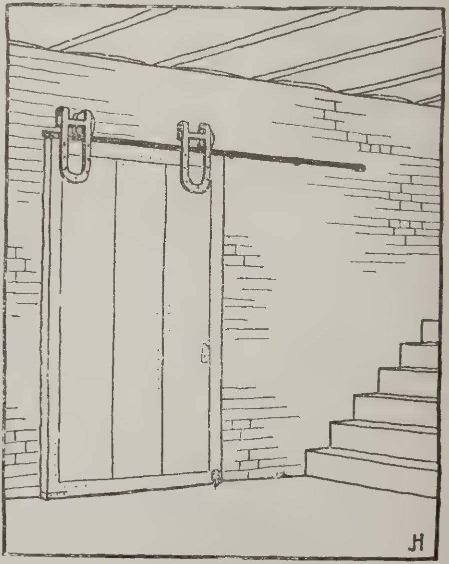

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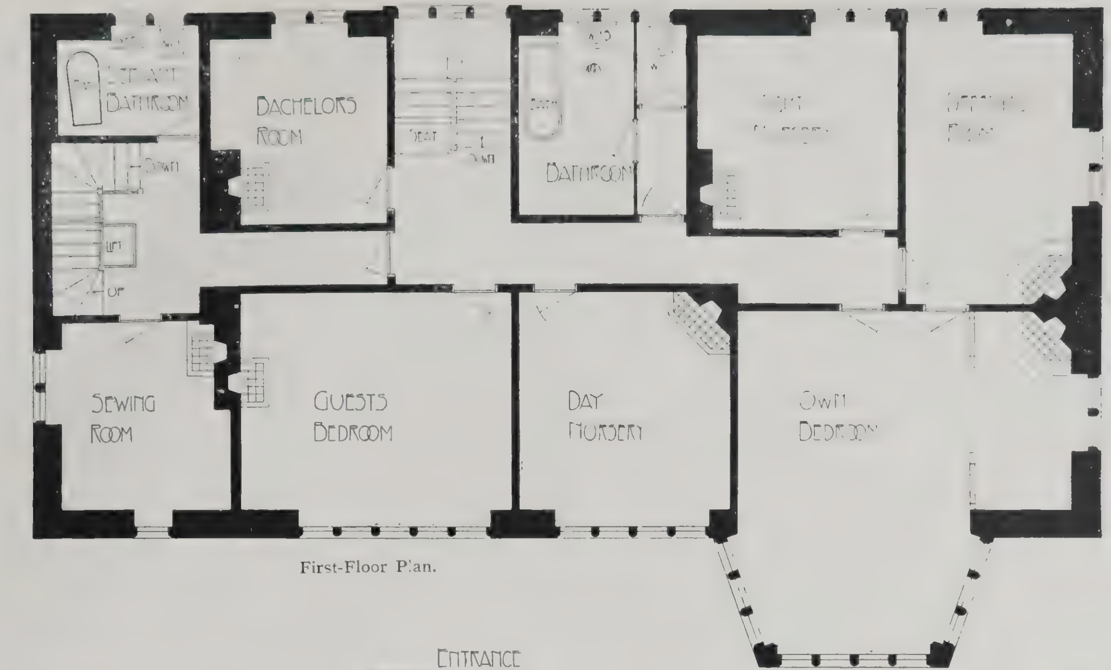
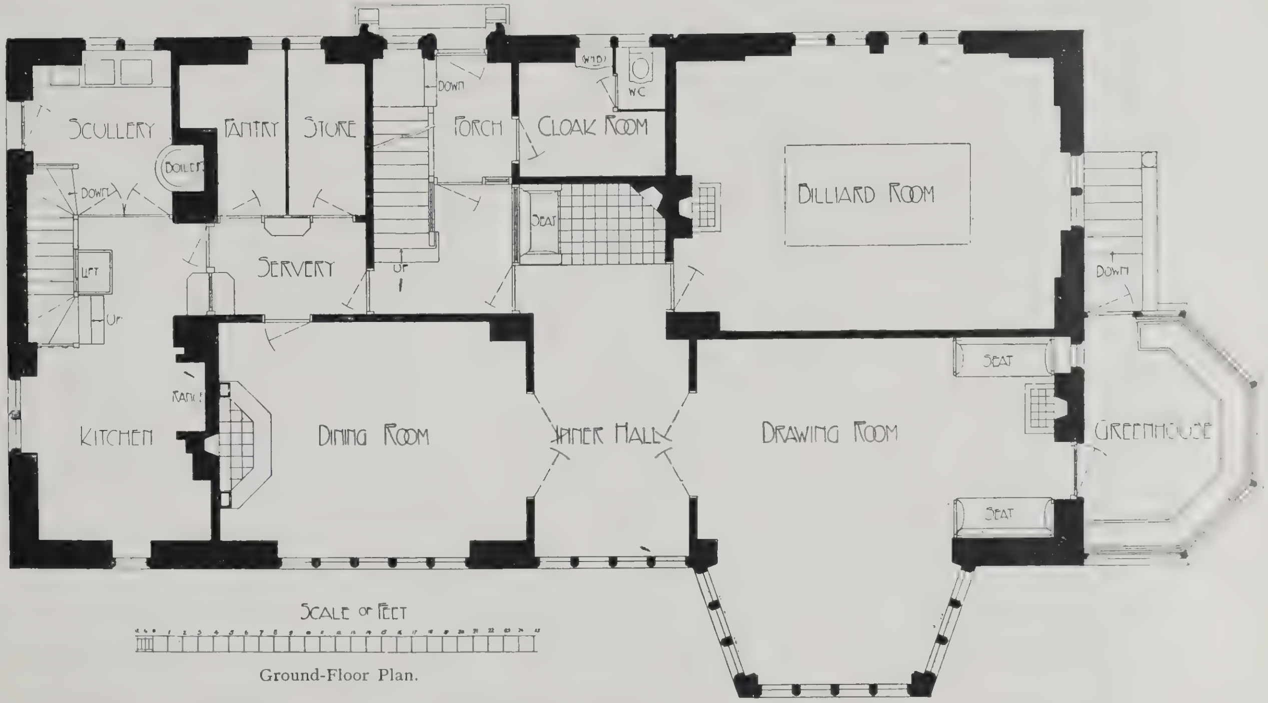
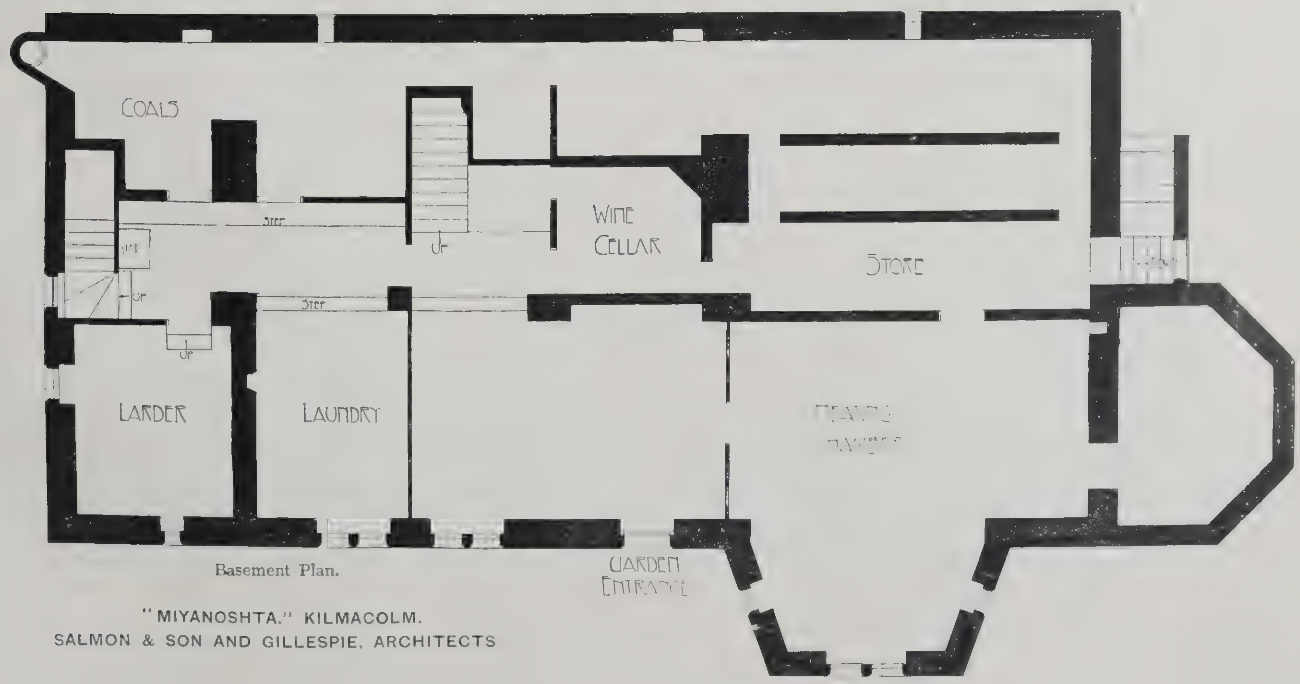
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, April 10th, 1907,



First-Floor Plan.



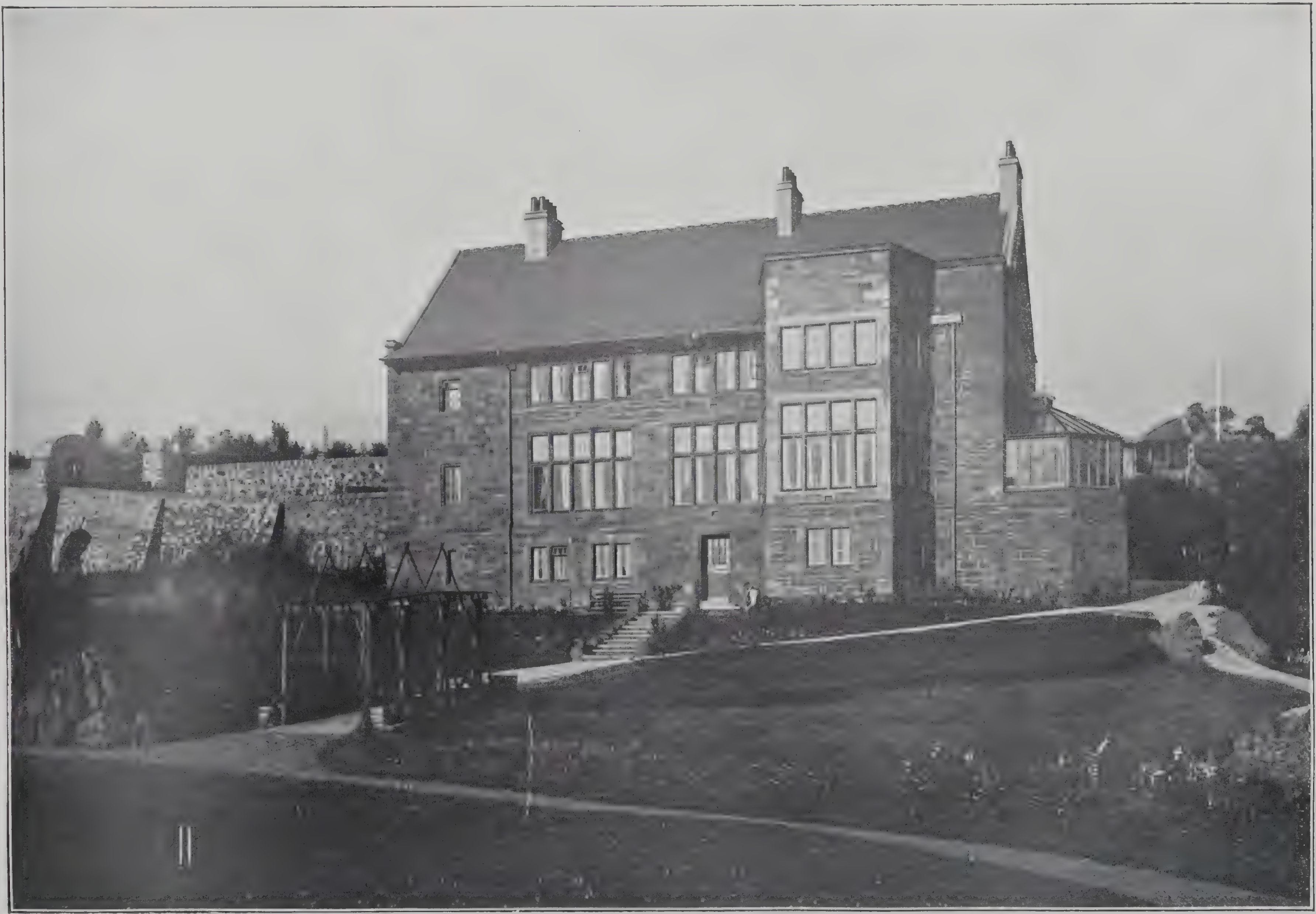
Ground-Floor Plan.



Basement Plan.

"MIYANOSHTA." KILMACOLM.
SALMON & SON AND GILLESPIE, ARCHITECTS

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, April 10th. 1907.



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Supplement to
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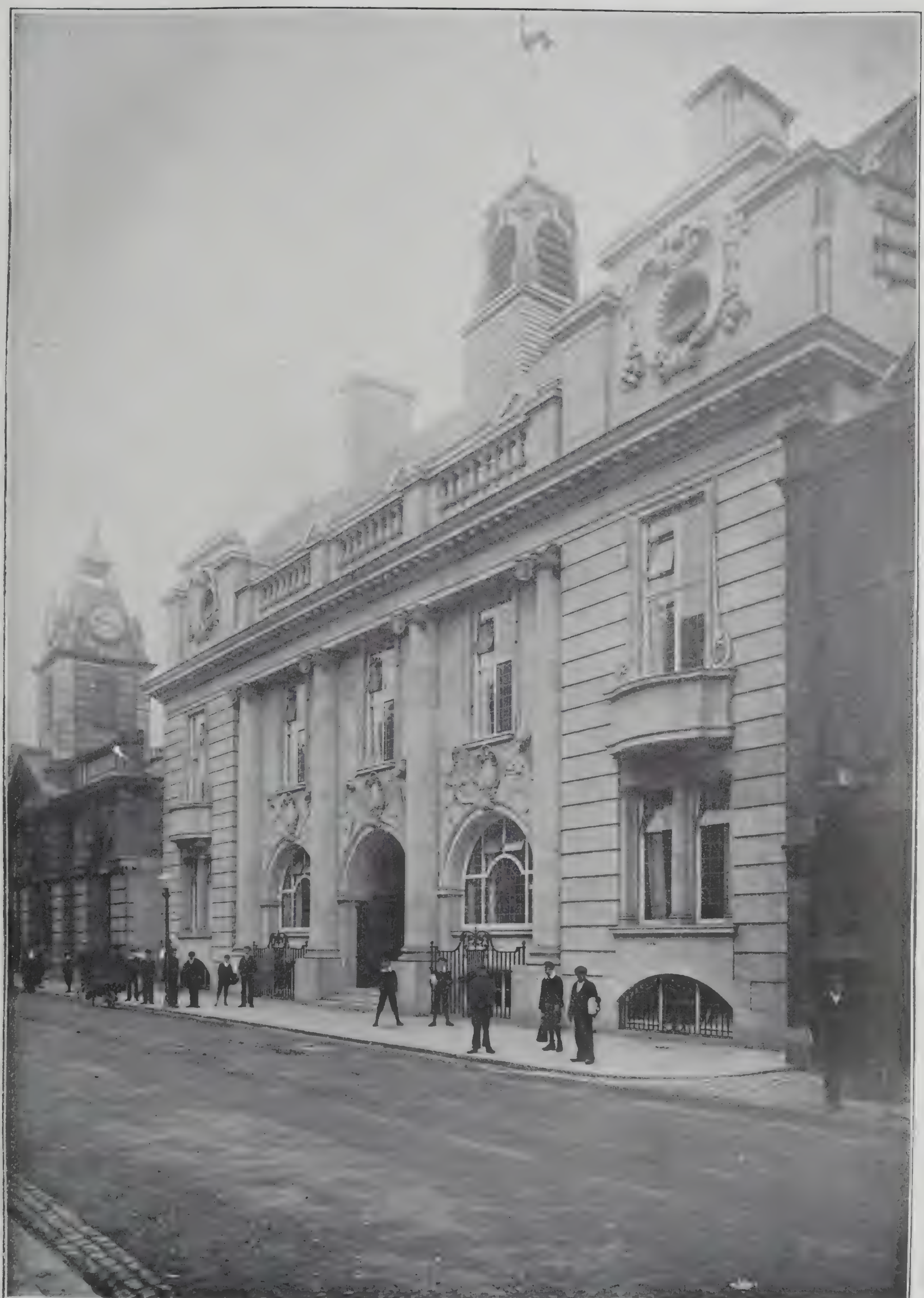
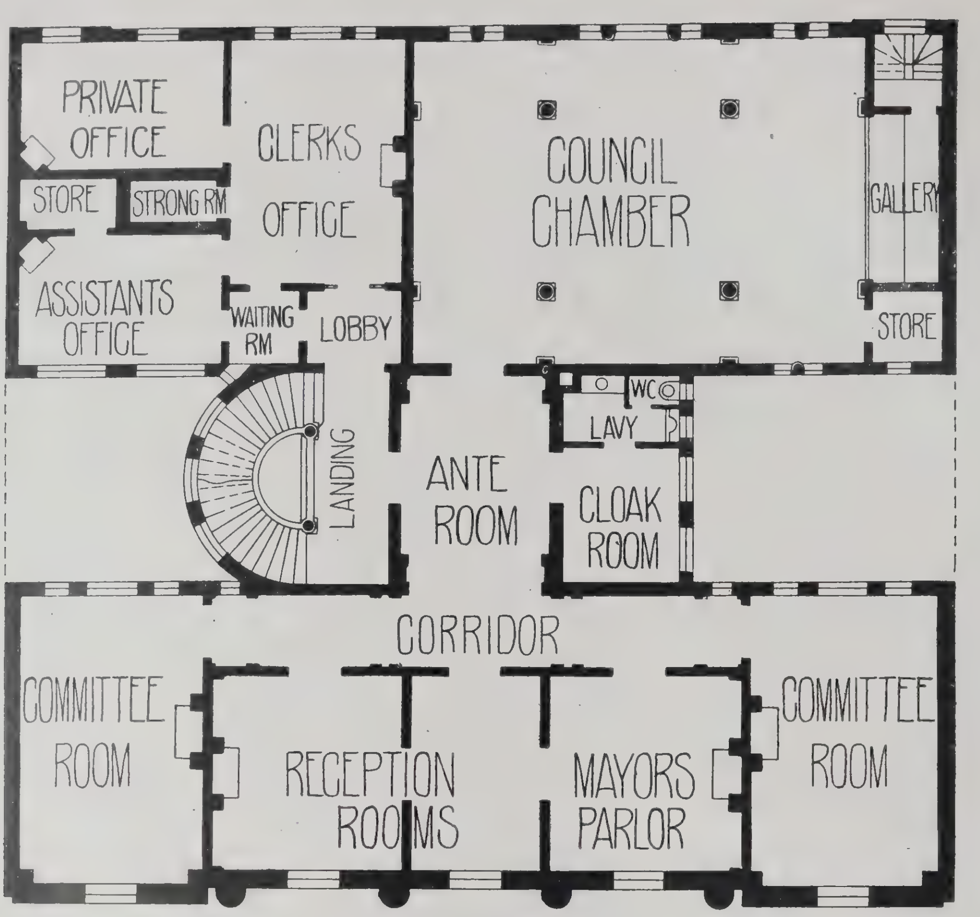
Wednesday, April 10th, 1907.

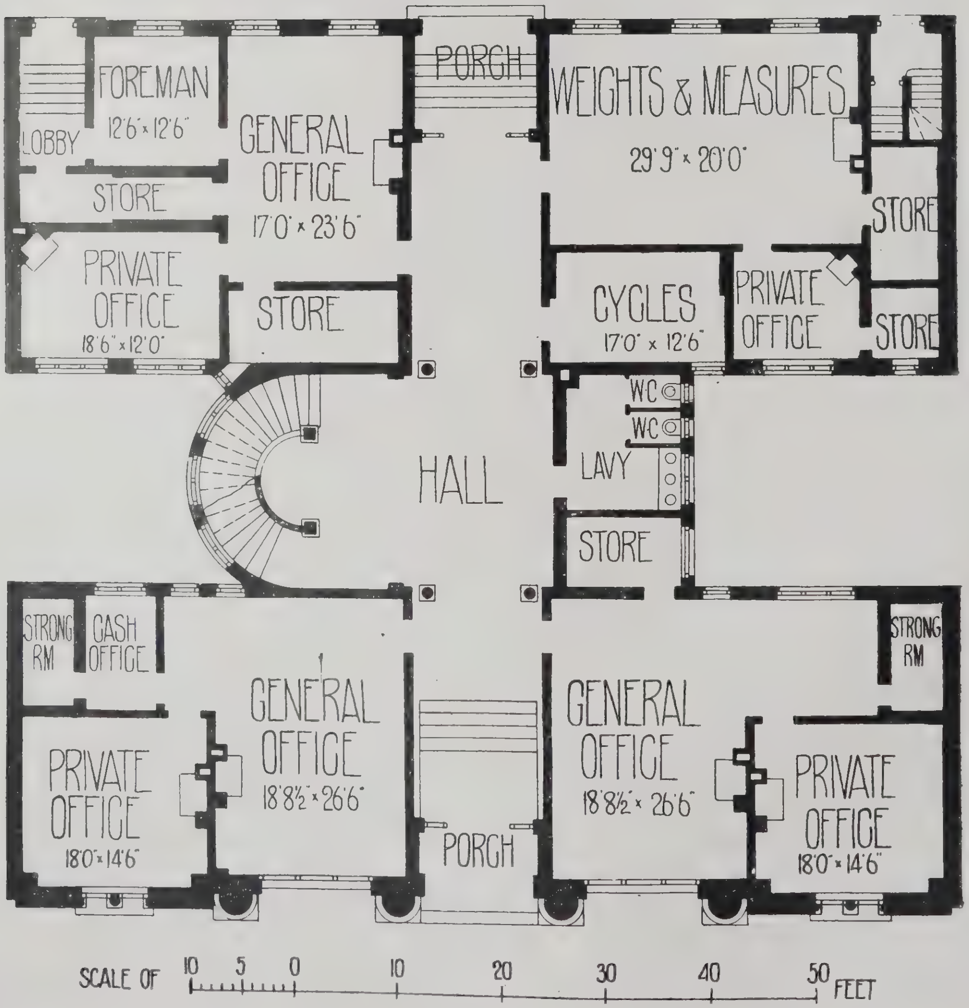


MUNICIPAL BUILDINGS, CREWE. HENRY T. HARE, F.R.I.B.A., ARCHITECT

Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, April 10th, 1907.



First-Floor Plan.


PORCH
FOREMAN 12'6" × 12'6"
LOBBY
GENERAL OFFICE 17'0" × 23'6"
WEIGHTS & MEASURES 29'9" × 20'0"
STORE
PRIVATE OFFICE 18'6" × 12'0"
STORE
CYCLES 17'0" × 12'6"
PRIVATE OFFICE
STORE
STORE
WC
WC
LAVY
HALL
STORE
STRONG RM
CASH OFFICE
STRONG RM
GENERAL OFFICE 18'8½" × 26'6"
GENERAL OFFICE 18'8½" × 26'6"
PRIVATE OFFICE 18'0" × 14'6"
PRIVATE OFFICE 18'0" × 14'6"
PORCH
SCALE OF 10 5 0 10 20 30 40 50 FEET

Ground-Floor Plan.

MUNICIPAL BUILDINGS, CREWE. HENRY T. HARE, F.R.I.B.A., ARCHITECT.

April 10, 1907.

Volume 25, No. 635.

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

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The **"Fire" Supplement** is given in this issue.

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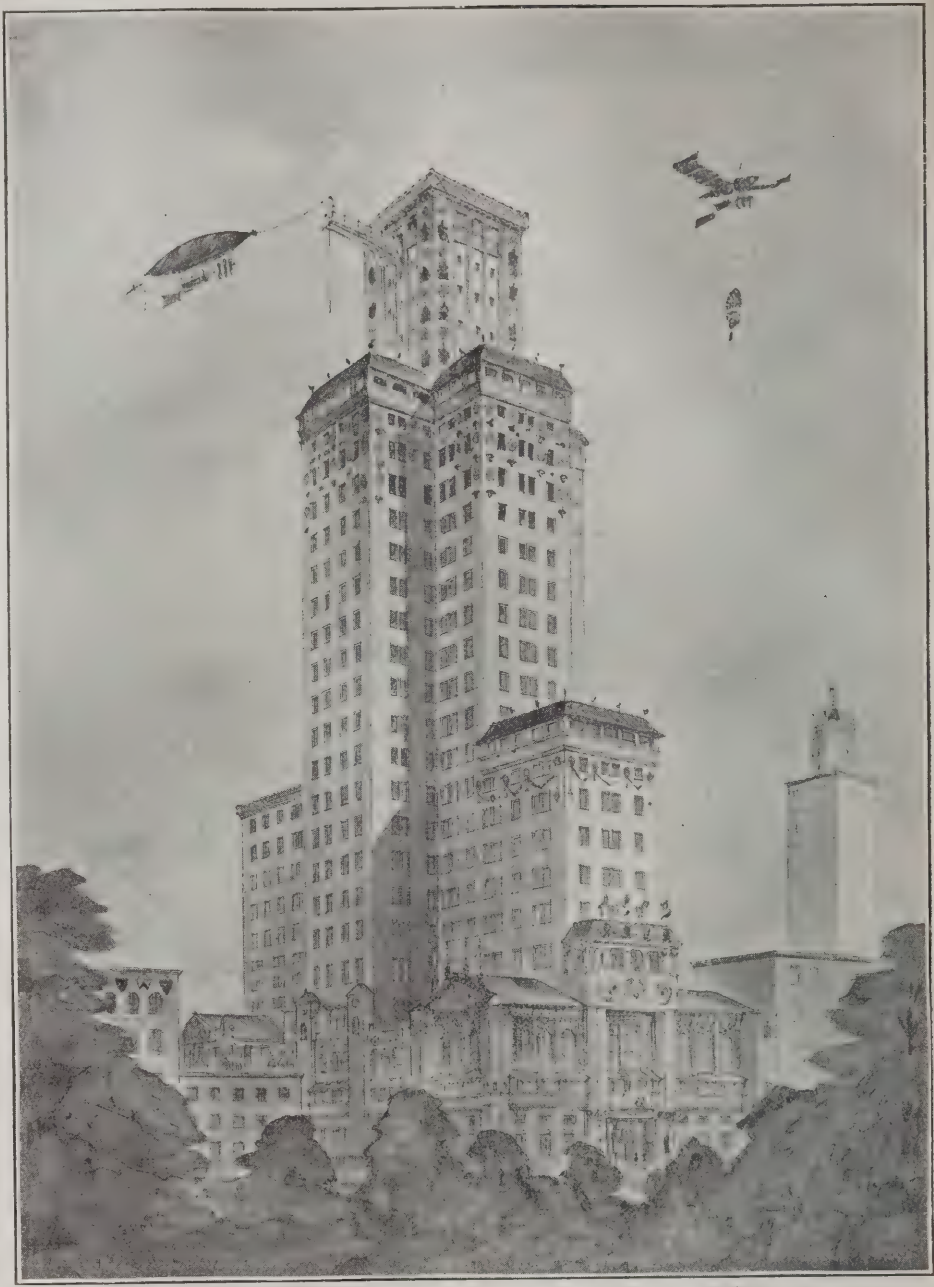
A Building Court for London. THE establishment of a separate Court to deal with building matters in the London area on somewhat the same lines as the Dean of Guild Courts in Scotland has been skilfully pleaded in "The Times" by Mr. John W. Simpson. After referring to the many Acts and regulations governing building matters in London, and the various authorities which have to be consulted, and the long and difficult procedure—as to the inadvisability of which complexity there can be no difference of opinion—Mr. Simpson says:—"And the very grotesque itself is reached when the citizen who ventures to differ from an 'authority' in the reading of this tangled bundle of clauses receives a 'summons' to appear before a police magistrate, where, in the company of thieves, harlots, and the scum of the criminal classes, he must balance his opinion against that of his 'prosecutor,' and be 'convicted' if unsuccessful by a judge who knows even less of the discussion than the parties themselves." The Building Act Committee of the London County Council Mr. Simpson calls the "Star Chamber" of to-day. "Sitting *in camerâ* for a few hours a week, hopelessly choked with work, it decides the fate of property which its members have never even seen; no applicant is allowed a hearing to support his case, its decisions are made on the evidence of officials alone." The remedy which Mr. Simpson suggests meets with Mr. William Woodward's general approval, though he differs on matters of detail, but Mr. Delissa Joseph doubts the efficacy of such a separate building Court, and we think there is some logic in his opinion, for, if the present London County Council officials are overtaxed, it is almost certain that a single court which had to deal with all the administration of building matters would subject building owners and architects to still more vexatious delay than occurs under the present procedure. Mr. Delissa Joseph calls attention to the fact that the principle of a tribunal of appeal for matters connected with building is already adopted, but its range is somewhat limited. He suggests that the powers of appeal to the existing Tribunal should be enlarged by giving it power to adjudicate on points between building owners and local borough authorities, upon questions under the Public Health Acts and upon questions of light and air. This suggestion seems to us to be far more practical than Mr. Simpson's, which is ideal if a separate administrative body with courts of appeal could be established, but the existing law under which municipal bodies have the administration of Acts of Parliament is not likely to be altered. For our part, we think the line of reform for all to work upon should be the repeal of existing Acts on building matters, and the provision of an entirely new Building Act, much as New York has recently done, and the widening of the powers of the Court of Appeal, so as to establish it as an extension of the idea of a separate commercial court which exists in practice, although theoretically only a part of the King's Bench Division.

House Design. So accustomed are we to hear only the one side stated at meetings of architectural societies when the subject of house design is under discussion that we quite overlook the fact that there is another aspect of the question—not the architect's, but the householder's. Thus it comes about that, while innumerable "treatments," or eccentricities rather, pass muster among the profession as the work of architects with "ideas," and while we are prepared to accept any amount of conjuring with light, and comfortable appearance, we are up in arms at once against the layman who ventures to express his own views on the matter. Windows are perhaps as good an example of this as may be found. The average householder, of course, has quite a mistaken notion about these, for we all know that he is more likely than not to judge the merit of a house according to the size of its windows. Nevertheless the size which some architects make their windows is both ludicrous and unhealthy. Ours is not a land of intense light and sunshine consequently we want good-sized windows. Let it be admitted that the average man wants windows which are too big, and that these are ruinous to the architect's design. Nevertheless the tiny square openings, half obliterated with the casement leads, are just as unreasonable and foolish, only that architects with "art" proclivities fail to appreciate this. It is all of course a point of view.

The Indian Victoria Memorial. It is announced that the engineering experts who were appointed by the trustees of the Victoria Memorial Hall, Calcutta, to examine the foundations and report on the possibility of erecting the building in accordance with the original plan, have not yet completed their enquiries. It was reported at the beginning of the year that the brick and concrete foundations put down in 1905 had sunk from 4ins. to more than 6ins. It now remains for the experts to say whether it would be safe to raise a heavy superstructure as designed, with a main hall and dome.

ARCHITECTURE AT THE ROYAL GLASGOW INSTITUTE.

The forty-sixth annual exhibition of the Royal Glasgow Institute of the Fine Arts cannot be said to be in any sense extraordinary. The majority of the pictures are of the usual commonplace type—good up to a certain point, but just falling short of being great either in idea or in execution. And the same thing might also be said of the architectural exhibits, with a few notable exceptions. They are fewer this year than on former occasions, and they are not so representative of architectural effort in Glasgow and the West of Scotland as they might be. A number of works are exhibited which have been illustrated in our pages, principally in our recent "Glasgow Number." The first in the catalogue—namely, the business premises of the Edinburgh Life Assurance Co., by Mr. John A. Campbell—is one of these. We need not comment on it further than to praise again its fine broad treatment and refined detail. That it looks just a little unfinished at the top floor is the only criticism one can venture of what is unmistakably a handsome addition to the city's architecture. The same architect also shows views of domestic work treated in a similar masterly way. Messrs. Watson & Salmon exhibit drawings of two cottages, while Mr. Macgregor Chalmers is represented by two photographs of St. Leonard's Church, Dunfermline, which latter is chiefly notable externally for its tall round tower, evidently modelled on the ancient round towers of Ireland: the design was illustrated in our pages some time ago. Mr. Chalmers also shows a photograph of an interior of a Renaissance church—St. Andrew's, Glasgow—the chancel of which has recently been restored under his direction. The Mitchell Library, by Mr. W. B. Whitie, is illustrated by a somewhat laboured monochrome drawing. It is from the same point of view as that published by us some time ago. The dome still appears a somewhat unsatisfactory adjunct. Mr. Fred Rowntree shows a beautiful drawing of his gatehouse at Ilkley. Messrs. John Burnet & Son are represented by a large view of the fine new premises in course of erection in Edinburgh from their design: a photograph of the building showing its skeleton was given in our "Concrete and Steel Supplement" recently. It rather overshadows the adjoining buildings and makes their detail appear somewhat puny and meretricious by contrast. "Carnbooth," Busby, by Mr. Alexander Cullen, is a very satisfactory treatment of the Scots Baronial style. Messrs. Salmon & Son & Gillespie show a frame of photographs of their recent ecclesiastical work, and a view of their Lion Chambers, Hope Street (illustrated in our "Glasgow Number"). Three designs of savings banks are shown—namely, the Govan branch by Mr. Eric A. Sutherland, the Parkhead branch by Messrs. Honeyman, Keppie & Mackintosh, and the Shawlands Cross branch by Mr. Neil C. Duff. The first was illustrated in our "Glasgow Number"; the second, which promises very well, is shown by coloured elevations; while the third is a photograph of a corner building of rather common type. The architects of the Parkhead Bank are also represented by coloured elevations of their two Sauchiehall Street fronts, which were completed last year, and one of which we illustrated. Messrs. Leadbetter & Fairley show a drawing of an Elizabethan mansion in Roxburghshire, which is pleasing, and Mr. F. W. Deas shows a number of interesting photographic details of two houses in Northumberland. Two of the competitive designs for the Crow Road Church, Partick, are exhibited, neither of which, however, is quite up to the best work of the authors, although one is somewhat ostentatiously labelled "placed first by Sir Rowand Anderson." Other church designs shown are Strathblane U.F. Church, by Messrs. Miller & Black—a Gothic interior, and New Cathcart Free Church Hall, by Mr. John Hamilton, illustrated by a frame of three photographs. In addition Mr. R. S. Lorimer has sent his photographs of Hallyburton (illustrated in "The Architectural Review"), Mr. A. N. Paterson a design for a golf club house, and Mr. J. C. M'Kellar photographs of a house for himself in Kelvinside. Besides these architectural works Mr. Joseph Pennell exhibits his series of etchings of New York skyscrapers, of which reproductions were published some time ago in the "Century," and there are several commendable designs for stained-glass windows.



DESIGN FOR A CITY HOTEL OF THE FUTURE. BY F. C. MEARS.

A CITY HOTEL.

The design for a city hotel here illustrated was submitted in this year's Soane Medallion competition of the Royal Institute of British Architects. The subject set for the competition was "A Large City Hotel facing a Public Square." Doubtless the promoters had no idea of receiving such a design as that shown above, and presumably it was thought to be too much of a fantasy to be seriously considered: nevertheless the design exhibits features of far more interest than the majority of the other designs submitted, which conformed to the ordinary type, and on that account we reproduce it in our pages. The author of the design is Mr. F. C. Mears, of Edinburgh, whose idea has been to get away from town hall Classic and to use modern materials in a modern way. Readers will recollect the suggestion made in our columns some time ago of "office towers" of the future—single or grouped blocks rising high above the streets and affording abundance of light and fresh air. This design is evidently an embodiment of that idea, but adapted to hotel requirements.

THE POTTERY INDUSTRY.

Report of the Tariff Commission.

A report of the Tariff Commission in reference to the English pottery industry has just been issued, with an analysis and summary of evidence taken, and statistical tables. It is obtainable from Messrs. P. S. King & Son, 2 and 4, Great Smith Street, Westminster, price 1s. nett, post free 1s. 3d. A considerable proportion of the report has relation to foreign competition.

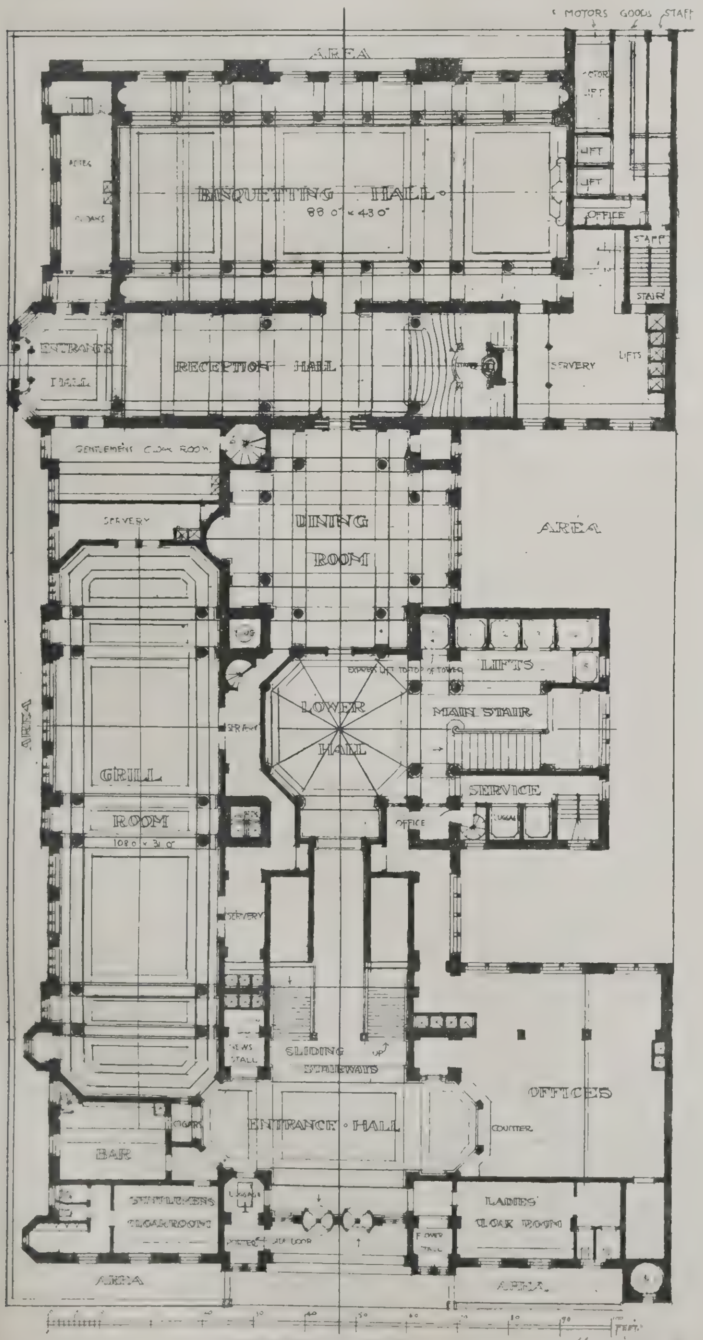
German Competition in Sanitary Ware.

Germany competes with us in sanitary ware in a number of foreign countries, and special mention is made of the harmful effect of the German subsidies to steamship lines which carry German produce to such foreign markets as the Argentine and Brazil. The export trade of sanitary goods to Germany is said to have "stopped entirely owing to the hostile tariff of 10s. per ton." The United States used to be the largest market for this class of goods, but the hostile tariffs have had a most damaging effect. The United States is also said to practically control the sanitary earthenware trade in Canada; German competition has been keenly felt in Canada, but British trade has considerably benefited by the preference and surtax. The trade with South Africa in sewerage pipes, &c., has been cut into in some instances by the importations from Belgium.

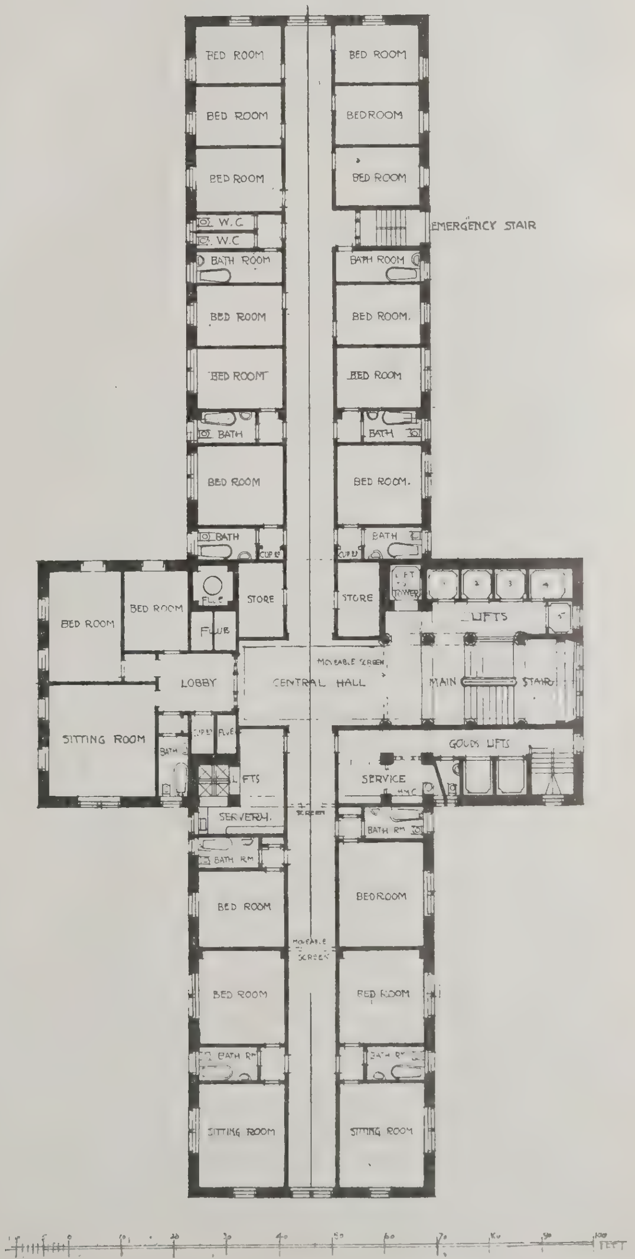
In regard to Germany it is stated that manufacturers in that country, having the double market at home and abroad, keep their factories going at full capacity, the only extra cost to them for the exported goods with which they undercut British manufacturers being that of raw material and wages. Thus the exported goods are often sold at any price they will fetch. In evidence it was stated that "a short time ago Messrs. Doulton & Co. were selling a registered design for 16s. per dozen. The Germans made copies and sold them in five or six towns in England and Scotland at prices from 3s. 6d. to 12s. 6d. a dozen for precisely the same article." The greatest complaint is made of the way in which German manufacturers pirate British designs. German wages are represented as being at least one-third lower than in England; also German hours of labour are considerably more per week than here, while the children are allowed to commence work much younger.

Bricks and Tiles.

The home trade in common bricks and some classes of tiles being a local trade is more or less in the hands of British makers. In other classes of bricks, tiles, floorings, and fireproof ware of all kinds there is evidence of keen foreign competition. Some classes of fireproof ware are said to have been displaced by foreign ware. There are heavy importations of foreign prepared floorings—a trade that has increased enormously of late years. Foreign manufacturers of fireclay goods are also very keen to capture contracts, and a case is quoted in which a British



GROUND PLAN "AERO".



PLAN OF AN UPPER FLOOR "AERO"

A CITY HOTEL OF THE FUTURE. BY F. C. MEARS.

contract was secured by a foreign maker who not only supplied the firebricks, but sent foreign workmen to lay the bricks.

Special reasons operate against exports of heavy classes of pottery, and the majority of British brick and tile makers do not attempt an export trade. France now makes its own tiles, &c., French clayworkers having to a large extent adopted English methods of manufacture. "The cheaper class of tiles, &c., which ten years ago used to be shipped to the United States and Germany in large quantities is practically dead, simply because they are making all they want themselves." In most cases the manufacture of these goods in their own country has been greatly encouraged by the imposition of duties more or less prohibitive of imports. Germany has made inroads upon British business with Portugal, Denmark, Sweden and Norway, with wall tiles and floor tiles. The United States competes with us in Canada, Australia and New Zealand in plain and enamelled wall tiles and floor tiles and firebricks. Belgium and Holland, besides competing in the United Kingdom, cut into British trade with the United States, Argentine Republic, Portugal, Canada, Australia and New Zealand in wall tiles and coloured enamel tiles. Sweden is our chief competitor in Russia in firebricks. French roofing tiles are chiefly used in parts of India and Australia—they also compete with British makes in South Africa.

Competition from Belgium, Holland and Austria.

With regard to Belgium, manufacturers state that considerable activity is being displayed there in the production of bricks, pipes and tiles, and sales in Great Britain from 20 to 30 per cent. below British cost price are spoken of. As to Holland, it is felt that Dutch progress in the pottery industry is especially concerned with the making and exporting of tiles, competition in this branch being regarded seriously by English manufacturers. It is stated that Dutch tiles are sold in England at 25 per cent. under the lowest English prices. One witness says: "The price for these tiles per square yd. is in Amsterdam 6s. wholesale, and in London 5s. wholesale, after carriage and shipping charges, &c., are paid." Dutch potters work at about 3s. 4d. a day as against English potters at 5s. and 6s. per day. Austrian competition is also felt, though not so much as German.

The U.S.A.

In regard to the competition from the United States, one manufacturer states that the very large trade in sanitary ware which he formerly had with that country has been entirely destroyed. "Our export trade to the United States has suffered. Years ago we used to ship some 200,000 firebricks a year, now our trade there is practically nothing." "Until the Dingley tariff there were few tile manufacturers in the United States; now there are many and large ones. Their trade has been built up distinctly in consequence of the protective policy. The tile manufacturers could not get on at all until the tariff was raised 25 per cent. *ad valorem.*"

Remedial Measures.

Witnesses are unanimous as to the necessity of the imposition of import duties in this country and a large number of manufacturers put forward suggestions, being practically agreed that duties of from 10 to 25 per cent. would meet the case.

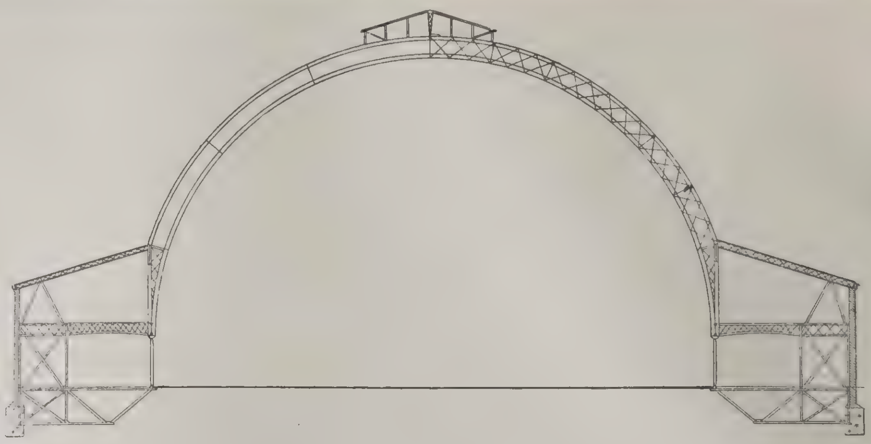


DIAGRAM OF THE ROOF OF OLYMPIA.

A NOTE ON OLYMPIA AND ITS ROOF

Visitors to the Building Trades' Exhibition at Olympia cannot fail to be struck by the size of the building and the great roof which covers it. We have thought it opportune, therefore, to resuscitate a few particulars, which will probably be new to many readers.

The foundation-stone was laid in July, 1885, and the building was opened on Boxing Day, 1886. The architect was the late Mr. Henry E. Coe, but owing to ill-health he resigned his position while the work was in progress of erection, and he was succeeded by Mr. James Edmeston, F.R.I.B.A. (Mr. Coe, it may be mentioned, was the architect of the Royal Agricultural Hall at Islington, in conjuction with his partner, the late Mr. Peck.) The roof of Olympia, and its structural ironwork generally, was designed and carried out under the supervision of Mr. A. T. Walmisley, M.I.C.E., and Mr. Max am Ende, M.I.C.E. The building contractors were Messrs. E. Lucas & Son, of Kensington, their contract amounting to more than £130,000, while the ironwork was supplied and erected by Messrs. Andrew Handyside & Co., the glazing and zinc work being by Mr. T. W. Helliwell.

Originally the building was called the "National Agricultural Hall, Kensington"; the name by which it is now known was adopted when the Paris Circus Co. were giving performances there.

The roof of the building has an extremely light appearance, by reason of the fact that every detail was adapted to meet the various stresses found by calculation (so as to avoid any unnecessary surplus material), and by a careful study of all the possible stresses resulting from equal and unequal loading, including wind pressure. The design is remarkable for the entire absence of long wide plates and webs, the various parts of wrought ironwork being composed wholly of flat bars and angle-irons riveted together, plates being introduced only where required to cover joints. In all, there are about 1,200 tons of ironwork in the building.

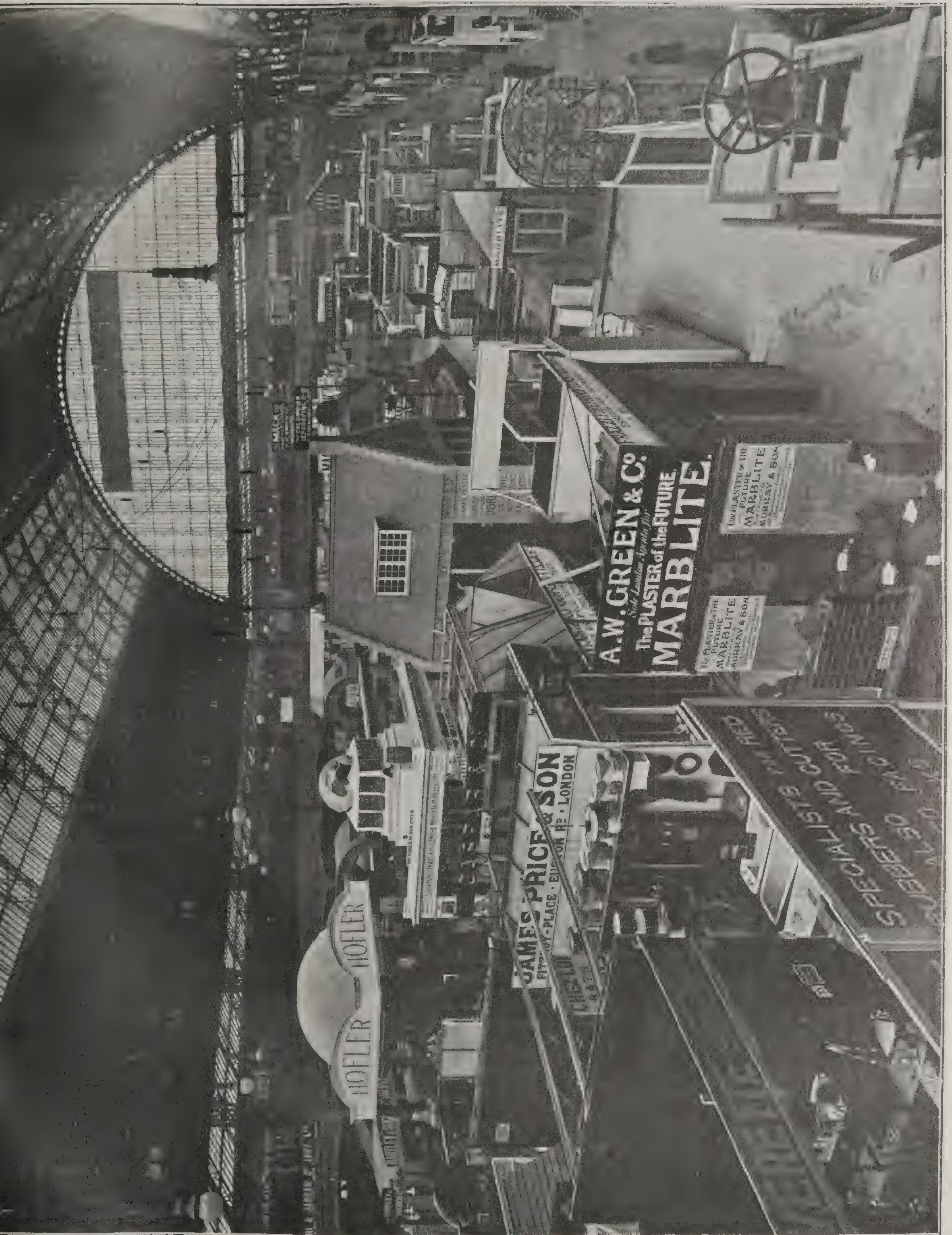
The great hall of Olympia is 440ft. long by 250ft. wide, the height to the crown of the roof being about 100ft. The main ribs of the roof have a clear span of 170ft., and are placed 34ft. apart. They are of box-girder form, 7ft. deep and 2ft. wide. The gallery around the hall is 40ft. wide on three sides, and 26ft. wide on the fourth side. It is covered by a lean-to roof, which abuts against the curved rib on the north and south sides, and is attached to the horizontal member of the end screens on the east and west sides. The brick walls of the building are not called upon to resist any portion of the thrust from the roof, as the side frames through which the gallery floor passes form a self-contained system of ironwork, in which the thrust is ultimately conveyed to the ground. Below the top of the roof over the side galleries the arched rib forms on each side an ornamental spandrel, which rests upon a column 12ins. in diameter, with ⅝in. thicknesses of metal, while the connection between the main rafter of the side roof and the arched rib is formed by a top plate which practically acts as a hinged or spring joint, whereby the complication of a fixed connection was avoided in the calculation of the stresses. On the assumption that the wind may be taken as acting normally, the maximum and minimum loads on the column under the springing of the rib amount to 82½ and 49½ tons respectively. These columns are of cast-iron, and have a ball and socket bearing at each end, the top bearing being concealed by a foliated capital, and the bottom bearing by a cast-iron base, giving the appearance of an ordinary column. By the introduction of this pivoted connection, the strains which the columns resist are always vertical, and therefore definite. The dead-weight only of the ribs comes upon the columns, any lateral thrust being resisted by the sloping lattice girders forming the main rafters of the lean-to roofs, and by them transmitted to the iron abutment framings which form partitions in the side aisles.

The screens which close the semicircular ends of the roof are of vertical ridge and furrow construction, this form offering great resistance to wind-pressure, while, at the same time, requiring a minimum amount of material. The framework of this part of the structure is of mild steel.

The cost of the iron and steel work erected complete was from £26 to £27 per square of 100ft. superficial area. Not a single accident occurred during the erection of the building.

The following comparison of five great roofs is interesting:—

	Span.
St. Pancras Station, London ...	240ft.
Central Station, Manchester ...	210ft.
St. Enoch's Station, Glasgow ...	198ft.
Olympia	170ft
Crystal Palace	104ft.


A.W. GREEN & Co.
Sole London Agents for
The PLASTER of the FUTURE
MARBLITE.
The PLASTER of THE FUTURE MARBLITE MURRAY & SON
HOFLER
HOFLER
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FITZROY-PLACE · EUSTON Rd · LONDON
SPECIALISTS IN CUT AND FIBROUS

GENERAL VIEW OF THE BUILDING TRADES' EXHIBITION AT OLYMPIA.

[*Photo: Tella Camera Co.*

THE BUILDING TRADES' EXHIBITION.

The Building Trades' Exhibition at Olympia was opened on Saturday by the Lord Mayor of London, Sir William P. Treloar. His Lordship, accompanied by the City Marshal and other officials, was received at the Hammersmith entrance, and, under the guidance of Mr. Montgomery, made a tour of the exhibition, evincing much interest in many of the stands, his genial presence and commanding figure meeting with appreciative comment at every turn. In the annexe his Lordship formally declared the exhibition open, and the company then proceeded to the Pillar Hall, where luncheon was served.

Among those present were—

The Lord Mayor, Mr. H. Greville Montgomery, Sir Aston Webb, R.A., Mr. George Frampton, R.A., Mr. Leonard Stokes, Mr. Henry T. Hare, Mr. Edwin T. Hall, Mr. Frank T. Baggallay, Mr. Cole A. Adams, Mr. T. W. Aldwinckle, Mr. Louis Ambler, Mr. R. Frank Atkinson, Mr. Arthur Keen, Mr. W. A. Pite, Mr. G. H. Fellowes-Prynne, Mr. John Slater, Mr. Matthew Garbutt, Mr. Sydney Perks, Mr. H. O. Tarbolton, Mr. T. B. Silcock, Prof. F. M. Simpson, Mr. Edwin O. Sachs, Mr. S. Perkins Pick, Mr. A. E. Pridmore, and a number of other well-known architects. Mr. F. L. Dove (president of the Institute of Builders), Mr. J. W. Lorden (president of the Master Builders' Association), Mr. B. E. Nightingale, Mr. H. H. Bartlett, Mr. William Robertson (Master of the Carpenters' Company), Mr. Alfred R. Smith (Master of the Tylers' and Bricklayers' Company), Col. Sir Walter Olivey, K.C.B., Col. F. Seymour Leslie, R.E., Lieut.-Col. H. A. Yorke, R.E., C.B. (Chief Inspecting Officer of Railways, Board of Trade), Prof. Henry Adams, M.I.C.E., the Lord Provost of Dundee, and others.

Mr. Montgomery, as chairman, having given the Royal toast, Sir Aston Webb, R.A., proposed a vote of thanks to the Lord Mayor for coming there to open the exhibition. Speaking of the character of a city's buildings, he was reminded of an old writer who had said, "Show me a man's accounts and I will tell you his religion." Similarly he might say, "Show me a nation's buildings and I will tell you what are its aspirations": for, after literature, there was nothing in which the history of a nation was more truly recorded than in its buildings. The buildings of the City of London could compare with those of any other city. In St. Paul's they had one of the great buildings of the world, while some of the more recent erections in the City were also very fine, though it was to be regretted that there was not more room around them to enable their qualities to be thoroughly appreciated.

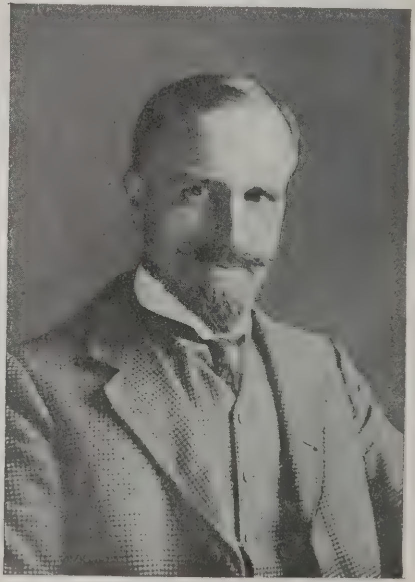
[Photo: London Stereoscopic Co.

THE LORD MAYOR OF LONDON,
SIR WILLIAM P. TRELOAR,
who opened the Exhibition.

Sir Aston Webb thought that the present exhibition was an extremely good one and he congratulated Mr. Montgomery on all the trouble he had taken in bringing it together. He ventured to think that it would be one of the most successful, one of the most interesting, and one of the most useful exhibitions of its kind that had ever been held. The problems which the architect had to face were many and increasing, and they looked to such exhibitions as the present to help them in overcoming many difficulties. There was, for example, the problem of the prevention of smoke, and the begriming effect of it on buildings which it attacked. The production of heat without smoke was the object to be kept in view, and he conjectured that in fifty years' time coal would be quite an out-of-date commodity, having been entirely supplanted by electricity. This problem of smoke might also be attacked by the use of materials that would resist the effects of smoke. The Savoy Hotel extension (by Mr. Collcutt) was an illustration of this, and there was another example in the house in Addison Road which Mr. Halsey Ricardo had carried out completely in glazed ware. In regard to the question of materials, architects looked first to beauty, then to durability, and equally with these to utility. Architects felt that colour and texture were more to be sought than great perfection in manufacture, and Sir Aston Webb ventured to remark that manufacturers had paid too much attention to finish than to form, colour, and texture. Durability was, of course, one of the most important qualities, and there was, too, another quality which he had not mentioned—namely, the insignificant one (!) of price. Architects had long come to the conclusion, however, that the thing which was lowest in price was not necessarily the cheapest in the long run, and, in conclusion, Sir Aston Webb remarked that while competition in quality was in every way to be desired as conducive to good results, competition in price was in the same way to be regarded askance, as tending to bad results.

Mr. F. L. Dove, president of the Institute of Builders, seconded the vote of thanks. In the course of his remarks he observed that the Lord Mayor, in making his tour of the exhibition, must have been struck by the great variety of the exhibits, almost everything being shown that was necessary in the erection and fitting of buildings, from the foundations to the last lock and finger-plate.

The Lord Mayor, in rising to acknowledge the vote of thanks which had been proposed and seconded, said that he could not help recalling on the present occasion how, many years ago, when he was a boy, he had attended a builders' beanfeast. At this ceremony one of the workmen got up to propose the health of the foreman, of whom he said: "What I likes about Bill Jones is that when he is in liquor he sits down quiet like a gentleman, and he don't look more of a fool when he's drunk than he do when he's sober." His Lordship thought this was really the ideal way of proposing a man's health, and he wished that Sir Aston Webb had followed this precedent, rather than dealing with technical matters with which he, the Lord Mayor, was not intimate. He had, of course, an interest in buildings; for instance, he was interested in the Mansion House because probably the rent of that building was about £50,000 a year, and during his tenancy he was exempt from the payment of any rates and taxes! It had occurred to him that this great building might be improved in many respects, but any improvements which he might institute would be for somebody else who succeeded him, and therefore it was not his intention to take the trouble to do so. Then, again, he had a house at Norwood, of which he had heard a passer-by remark: "That's where the Lord Mayor lives when he ain't Lord Mayor." With this preliminary digression his Lordship went on to speak of the exhibition. He thought that this was bound to do a great deal of good to everybody connected with the building trade who came to see the



[Photo: Mills

H. GREVILLE MONTGOMERY, M.P.
Organiser of the Exhibition.

exhibits, because they had thus brought to their notice new inventions and new methods of construction which it was of much interest for them to see. He ventured to think, however, with all deference to Mr. Montgomery, that the exhibition, though a great one, was not complete. There were no carpets! That was a very serious deficiency, and he hoped it would be remedied next time; for, after all, the beautiful buildings which they saw foreshadowed by the great variety of the exhibits would be comparatively useless without carpets! His Lordship said he liked to talk to people on a subject which they knew nothing about, because everybody then felt very comfortable, and he could go on for a long time, but in coming before a number of experts such as he saw around him he felt that the least said the soonest mended. It had, however, given him pleasure to be there that day, and he drank to the continued success of the exhibition, coupled with the name of Mr. Montgomery. It was, he was told, quite the best trade exhibition that had ever been held, and this reminded him that exactly the same thing was said about Lord Mayors, and had been said for the past 700 years. The Lord Mayor in existence was always the best Lord Mayor that had ever existed, and he believed that sentiment would continue until next November, after which time he had no interest in the matter, nor in anything that might go on for the next 700 years!

Mr. Montgomery acknowledged the references to himself. He said he had done his utmost to make the exhibition a success, and he called to mind that when he took over the direction of these exhibitions about twelve years ago, when they were held at the Royal Agricultural Hall, Islington, the exhibits were then of such a varied character as to include hansom cabs, sweet-stuff stalls, a shooting gallery, and other side shows. All that had been changed, it having been his endeavour to have nothing in the exhibition which was not in some way or another connected with the building trade. It was perhaps not for him to say so, but he really felt that this was the finest and most comprehensive trade exhibition that had ever been held in this or in any other country, and he expressed the hope that it might help to bring about the prosperity of the building trade, which had unfortunately been so long delayed.

MR. H. GREVILLE MONTGOMERY, M.P.

Readers will doubtless be interested to have a few biographical notes about Mr. H. Greville Montgomery, the organiser of the Building Trades' Exhibition. Mr. Montgomery was born in London in 1863. In the early part of his career he was engaged in secretarial work, and he afterwards wrote for many of the London journals as a free lance. In 1892 he founded "The British Clayworker," which has become the official organ of the brick, tile, and kindred trades in this country. Having established this monthly, he devoted himself to the founding of the Institute of Clayworkers, in conjunction with which he inaugurated (in 1898) the British Clayworkers' Mutual Insurance Corporation, Ltd. Ever ready to look after the interests of the trade, Mr. Montgomery organised, in December, 1900, a deputation to the Goods Manager of the Great Eastern Railway, with the object of bringing forward certain grievances in regard to the damage done to clay goods in transit, and later—namely, in March, 1903—he organised another deputation to the General Manager of the Midland Railway with the object of bringing forward the question of "owner's risk."

It was in 1895 that Mr. Montgomery took over the management of the Building Trades' Exhibitions, which had been held at the Royal Agricultural Hall, Islington. At the time these exhibitions came into Mr. Montgomery's hands they were moribund affairs, but, under his energetic direction, matters were soon altered, so that now the exhibitions are representative of the whole building trade, and are thoroughly supported by the leading firms. In 1903 Mr. Montgomery organised a similar exhibition for the colliery interests of this country, which is also carried on with success. At the last general election he contested the Bridgwater Division of Somerset, and, with a good majority, was returned as the Liberal M.P. for that district.

THE EXHIBITS.

The exhibits are so numerous that we are unable to deal with them all in one issue. We give, however, as full an account as possible, leaving the remainder to be noticed in our issue for next week.

Associated Portland Cement Manufacturers.

This stand, at special position No. 16, has a great attraction for visitors at the exhibition, not only by reason of the effective way in which it is treated—being a large white stand embellished with a number of photographs of buildings in which "Associated" cements have been used—but also because of the variety of the exhibits and the tests that are carried out there. First are seen the raw materials used in the manufacture of Portland cement, and then stage by stage it is shown how these materials are made into a slurry, burned, and the resultant clinker ground to the requisite fineness. Briquettes of various ages are tested for tensile strain, and other tests are carried out in conformity with the requirements of the British Standard Specification. The company has, of course, a very extensive control over Portland cement, having acquired in 1900 the works and businesses of twenty-two of the leading manufacturers. The various properties owned by the company in the valleys of the Thames and Medway alone cover 4,000 acres; the largest works on the Thames being at Northfleet, Swanscombe and Grays, and on the Medway at Rochester, Halling and Burham, while some idea of the magnitude of the company may be gauged from the fact that 6,000 people are in its employ.

The Well Fire.

No. 92, row E, the stand of the Well Fire Co., Ltd., of 33, Dover Street, W., is notable for the great number of excellent designs shown. In the majority of instances the firegrate has a tiled surround and hearth, with wood or iron mantel, and the greatest taste is displayed in the treatment, one or two of the exhibits being extremely good. Most of the patterns shown are of the Bowes patent well fire, which burns level with the hearth, taking its air-supply through channels which have openings in the kerb on either side; but there is also shown the "Pyramid" fire, which is a cheaper form, though having somewhat of the same appearance as the well fire. It may be noted that the firm have suffered considerably from imitators who have taken the term "well fire" and adapted it to their own uses, with the result that a stigma has been attached to the original Well Fire Co. through faults in the manufactures of their imitators, for which of course they are in no way responsible.

Austrian Oak Work.

Messrs. Höfler, Ltd., of 26D, Soho Square, W., exhibit at special position No. 17 some good examples of their Austrian oak panelling, etc., together with a large wood Georgian chimney-piece, also in Austrian oak; this latter was designed by Mr. Joass, and is particularly effective. "Durato" jointless flooring, art metal work and asphalted sheet lead damp-course are also shown at this stand.

THE STAND OF THE NEWELLITE GLASS TILE CO., LTD.

Newellite.

It was an ingenious idea of the Newellite Glass Tile Co., Ltd., to show at their stand (No. 85, row D) a section of "underground" tunnel lined with their tiles, as illustrating the work which they have carried out on the Angel to Euston extension of the City and South London Railway. This section of tunnel is extremely effective. The special feature about "Newellite" glass tiles is that they have an elastic key, which allows the glass face to yield to the action of the cement on which they are fixed, thus preventing surface cracking or crazing.

Kitchen Fittings.

At stand No. 87, row D, Messrs. Benham & Sons, Ltd., of 66, Wigmore Street, W., have several special exhibits. Among these is a central hot-plate, 10ft. 6ins. by 5ft., such as supplied for high-class hotels; this being of wrought steel throughout, with the exception of the top, which is of heavy cast-iron. Another interesting exhibit is the "Wigmore" kitchener. This is intended solely for cooking purposes, having roasting fire, two ovens, hot closet for plates, and tiled covings. For hot-water supply the firm have an independent "Wigmore" boiler and cylinder, by which separate system they claim that an ample supply of hot water is obtainable at all hours without interfering with the cooking and without wearing out the range. The fuel consumption is economical, as it is claimed that the saving in coal for the range more than compensates for the small amount of fuel used in the boiler.

Gilmour Doors.

Since the Gilmour door was introduced into this country from Canada a few years ago it has met with a wonderful reception, and this is not to be wondered at, for the manner of its construction is such that all warping and twisting and splitting is done away with. The Gilmour Door Co., Ltd., of 52, Berners Street, W., show at special position No. 2 a great variety of their doors, built up of numerous kinds of wood and finished in many ways. The construction of the door consists essentially in forming a core of comparatively soft wood, thoroughly dried and arranged in various ways of the grain, and casing this core with a hardwood, the whole operation being done under great pressure. The result is an absolutely sound door with no risk of splitting or warping. It should be noted that the hardwood is not a *veneer*, but a substantial *casing*, and the sections at the stand show how thoroughly the core and the casing are held together. It would be impossible to use some hardwoods solid in the way they are used in these doors as casings, and there is also this advantage about the Gilmour door, that it enables a door to be finished on one side with one kind of wood and on the other side with a different kind of wood, this being especially useful in many cases; while in the matter of finish it is remarkable what can be done, an especially beautiful door shown at the stand being one in mahogany with quarterings of reversed grains.

Ripolin.

At special position No. 6 Messrs. Ripolin, Ltd., of 110, Fenchurch Street, E.C., have a large stand treated with their paint in various colours, and with glossy and matt surfaces, the interior of the stand representing a room in the Empire style, with a colour scheme of green, white and blue.

n Excellent Stand.

Perhaps the most effective stand in the exhibition is the little brick house erected at No. 126, row G, by Messrs. C. H. Norris, Ltd., of Erith, Kent. This is in the Georgian style, and was specially designed for the firm by Mr. R. Frank Atkinson, F.R.I.B.A. It shows the delightful effect of broken colours in brickwork, and is a credit both to the architect who designed it and to the firm with whose materials it is carried out.

THE STAND OF MESSRS C. H. NORRIS, LTD.

MESSRS. DOULTON & CO.'S STAND IN THE ANNEXE.

Messrs. Doulton's Exhibit.

Messrs. Doulton & Co., Ltd., of Lambeth, S.E., have very striking stands in the annexe, Nos. 211 and 212, row O. Their glazed terra-cotta—the well-known Carrara ware—is exhibited in the form of two blocked columns on pedestals, in green and cream. The walls are lined with glazed tiles. Altogether the exhibit of faïence work is one of the best in the exhibition, and should lead to the more general adoption of such forms of wall surface for both external and internal use. It is quite unnecessary to speak of the artistic taste displayed in the designs and the colour schemes, for Messrs. Doulton's name is a synonym for artistic merit. Fireplaces are also exhibited, while at one end a number of baths are shown made of cast iron and white porcelain enamel. These are of various types, including plunge baths and spray and shower baths. The finish is excellent, and the fittings are neat and serviceable. A number of sanitary fittings are also exhibited, but these are so well-known that we need not here go into details.

Hot-Water Boilers.

There is a great variety of these at position No. 18, occupied by Messrs. Hartley & Sugden, of Halifax. Here is shown the new patent "White Rose" sectional cast-iron boiler, which can be obtained in all sizes, one small pattern being especially useful for motor houses, etc. Another exhibit is the "Saville" hot-water boiler for baths, lavatories, etc., in hotels and mansions, this boiler having a waterway bottom which allows all sediment to accumulate below the grate bars, so preventing any damage being done to the boiler. Another boiler shown is especially intended for small villas, being adapted to burn any refuse from the ordinary range, so that in hot weather the latter can be dispensed with when no cooking is required to be done, while at the same time a continual supply of hot water is obtainable throughout the house.

"Emdeca" and "Steleonite."

The "Emdeca" Decorations and "Steleonite" Steel Ceilings Co., of 97, Queen Victoria Street, E.C., occupy special position No. 3, their stand being covered with the firm's two special materials. "Emdeca" is, of course, well-known as a covering for walls and ceilings, and its use is becoming more and more extensive. It is an enamelled zinc sheet decoration, easily applied, and giving the appearance and finish of tilework at about half the cost of the latter. It is not nailed in place but fixed with a paste made up of white lead and whiting mixed with varnish or gold size, and when thus fixed remains in position. The sheets vary in size from 16½ins. by 22ins. to 26ins. by 38ins., and can be bent to fit angles, etc., without the surface being injured in any way. "Steleonite" ceilings are, as the name implies, made of stamped steel (Bessemer sheet), being intended to replace plaster. Like "Emdeca," they can be easily applied.

THE STAND OF "EMDECA" DECORATIONS AND "STELEONITE" STEEL CEILINGS CO., LTD.

Paints, Varnishes, and Putty.

Messrs. Walter Carson & Sons, of Grove Works, Lombard Road, Battersea, S.W., display at stand No. 230, row Q, of the annexe, a number of their paint specialities. There are a number of pure liquid paints; "Muraline," their well-known washable water paint; "Vitrolite," the new liquid white paint; "Japolite," the new white japan; the "La Belle" enamels; and aluminium paint for hot-water and steam pipes, and ironwork of every description; together with various oil varnish stains. A particularly interesting exhibit is "Plastine," an imperishable putty which remains flexible for a great while after use.

Glazed Bricks.

Tier on tier of glazed brickwork in a great variety of colours—that constitutes the stand (No. 89, row D) of Messrs. Stanley Brothers, Ltd., of Nuneaton. It is surprising in what a variety of colours these glazed bricks are produced. This wide choice will doubtless commend itself to many visitors in need of good material.

Hall's Distemper.

At stand No. 91, row D, is a bungalow treated throughout with Hall's Distemper and other decorative materials of Messrs. Sissons Brothers & Co., Ltd., of Hull. The effect is particularly good, the rooms showing what artistic effects can be produced in Hall's Distemper in conjunction with the stencil designs now supplied for use with it, while several of the firm's paints and enamels—especially the "Aperfectol" green paint and the "Sisco" white japan, with which the entrance trellis porch to the bungalow is treated—are similarly shown to great advantage.

Lifts and Electric Riveting and Drilling Machines.

Messrs. Carl Flohr, of 73A, Queen Victoria Street, London, E.C., exhibit at their stand, No. 194, row M, in the annexe, a model of their patent electric push-button lift. Messrs. Flohr are one of the largest firms of lift manufacturers in the world, and they are pioneers in the business. Those interested in such matters will do well to carefully inspect this model, which embodies the latest improvements in such automatic lifts. The safety devices are excellent, and the inconveniences that appertain to some forms of these automatic lifts are entirely overcome. Perhaps not so important, though far more striking to the casual observer, are the universal electric suspended drilling and riveting machines on view. These are suspended in such a way that in a few seconds they can be placed at any angle, whereas the ordinary machines for doing such work are often permanently fixed and remain at one angle, necessitating the work being turned so as to be normal to the direction of the applied pressure. To lift long and heavy pieces of steelwork is inconvenient; it is much easier to be able to shift the machine, as in this case. As regards the riveter, electric power is much more economical than hydraulic power, for there is no loss of energy during the time the machine is not working.

Saxon Portland Cement.

The Saxon Portland Cement Co., Ltd., of Cambridge, have an interesting stand in the annexe, No. 184, row L, containing as it does samples of the material in various stages of manufacture, as well as the finished product. Saxon Portland cement is one of the leading brands on the market, as the manufacturers have a reputation for taking the greatest care and using the most scientific methods in its preparation. The sample of finished cement shown is very finely ground, leaving only 1 per cent. on a sieve containing 5,800 holes per sq. in. The tensile strength of Saxon cement is remarkable, a minimum of 600lbs. per sq. in. being guaranteed. Its expansion under the Chatelier test is only 1.5 millimetres, compared with the 6 millimetres allowed by the British Standard Specification, which all Saxon cement is guaranteed to pass. Both the old and the new rotary processes are used in its manufacture, and the annual output of the Saxon Works and the Norman Works is 100,000 tons each. An interesting pamphlet is obtainable at this stand, giving details of the manufacture and quality of the cement, with illustrations showing portions of the works, plant and jobs where Saxon cement has been used.

Sanitary Appliances.

Messrs. Adamsez, Ltd., of 7, Old Queen Street, Westminster, have a stand at bay 13, in the gallery. A number of their sanitary appliances should be carefully inspected. Adamsez fittings are noticeable for the cleverness and logic of their design. We may refer particularly to the new patent "Krator" fire-back with barless grate. This allows the portions which are subjected to damage from heat to be removed and replaced whilst the upper portion remains intact. This upper portion is connected direct to the chimney flue, thus ensuring a good draught and preventing smoky chimneys. The "Krator" chimney-pot is also noteworthy. It has a three-sided form, securing a wide surface for wind, and an up-blow. Other designs are their "Helios" and "Krator" sinks, in which a draining ledge is provided. The latter is a combination of sink and lavatory, having a bowl formed in the bottom.

Moulded Concrete by a New Process.

The Improved Construction Company, Ltd., are showing at stand No. 79, row D, examples of their moulded concrete manufactures, consisting of pipes, railway sleepers, paving slabs, building blocks, tiles, &c. The last-mentioned are moulded in many colours with glazed and dead surfaces, and illustrate greatly improved methods of manufacture. But the chief interest of the exhibit are the larger articles which are moulded by the new wet process, which is described on page 169 of this issue in connection with a description of the company's works. The wet process that is rendered possible by these new patent shaking tables produces an altogether superior quality concrete, and it allows blocks to be moulded containing reinforcing metal, such as railway sleepers and pipes. Indeed, it allows pipes to be moulded on the flat, which cannot be done by any other process.

Self-Flanching Chimney Pots.

Messrs. Notley & Taylor, of Finsbury Pavement House, Finsbury Pavement, E.C., at stand No. 3, row B, in the gallery, are exhibiting their "Notlor" chimney pots and system of curing smoky chimneys, as well as patent blinds. The "Notlor" chimney pot has a novel feature in that it is self-flanching. The saving of flanching renders it economical, while it produces a much more workmanlike job at the same time, for cement flanching always disintegrates after a time. The "Notlor" chimney pot is in such a form that it will serve as the base upon which various shaped tops can be placed and tried until success is obtained with one or other. The self-flanching pot is an idea in building construction which should be generally adopted, for it has certainly an advantage over the old inefficient flanching.

The "Ellkay" Folding Bath.

This well-known bath, of which the makers are Messrs. Ellkay & Cornes, of 59, Holborn Viaduct, E.C., is exhibited in a number of patterns at stand No. 53, row B. It is eminently useful for small properties where space is restricted, and besides being supplied with the familiar cabinet into which it is folded when finished with, is also made separate for servants' quarters, bungalows, etc.

"Flexible Compound."

Mr. Howard R. Justice, of 55 and 56, Chancery Lane, E.C., is exhibiting at stand No. 242A, row R, Hayes' patent sheets for lathing plaster ceilings or partitions. The key for the plaster is obtained by the prongs of metal which are left by punching the sheet in a special way. There is also exhibited a new "flexible compound"—a linseed oil product of the nature of a lacquer, which gives great flexibility to paint and varnish, and certainly has remarkable resistance to weather as proved by experiments, which distinguishes it from ordinary linseed oil. It has really surprising properties for an oil product, and all users of paints and varnishes should take note of the exhibit.

Air-Propellers.

At bay No. 22 Messrs. Matthews & Yates, Ltd., of Swinton, near Manchester, exhibit their well-known "Cyclone" air-propellers. Varieties of these for ventilating smoke-rooms, billiard-rooms, &c., are shown, some driven by electricity, others from steam power; and especially interesting is the type for collecting shavings, dust, &c., in sawmills, joinery works, and similar places, this being shown in connection with a planing machine to illustrate how thoroughly it does its work.

New Ideas in Sanitation.

The Sanitary Appliances Syndicate, Ltd., of 68, Victoria Street, Westminster, have what may justly be called one of the most important exhibits in the building (stand 86, row D), for there are shown a number of sanitary fittings that embody many new ideas and original features. "The Only" appliances are designed in conformity with the most up-to-date ideas in sanitation. The main principles of most of the inventions shown at this stand are (1) a simple plug non-return valve, which gives full way in the pipe; (2) a conical float air valve, which permits of the uninterrupted passage of fluid one way, and of the free passage of air, until the fluid endeavours to return, when it impinges on the flat base and floats it into position, where it hermetically blocks the passage; and (3) another non-return valve with a balance weight attached that renders it extremely sensitive, so that it can be used with an inlet sewer ventilator. By the application of these valves a silent closet only 3ft. 9ins. high from floor to top of w.w.p. has been designed, which fills on pressing down the seat, and automatically flushes on a person rising. Several varieties of anti-backflooding traps and gullies, domestic cold water storage cisterns without ball-valves, fire hydrants, water mains, pumps, taps, &c., are arranged with adaptations of one or other of these valves.

"Wrotham" Bricks and Tiles.

Messrs. Thomas Pascall & Sons, of Wrotham, Kent, have erected at stand No. 108, row F, a neat little house, showing the qualities of their hand-made bricks and tiles, which are each obtainable in three shades—namely, dark, medium and light red.

Signs, Letters, &c.

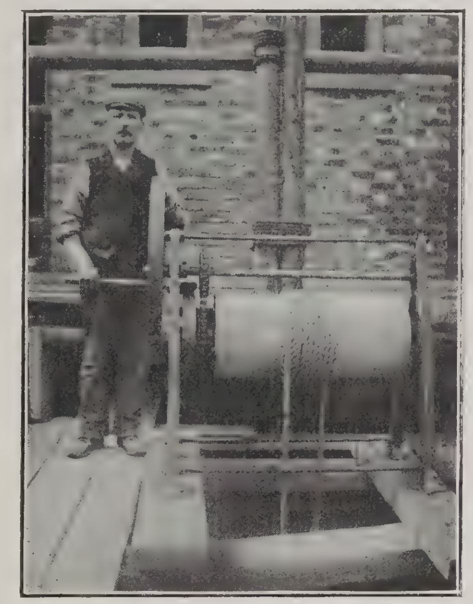
All kinds of signs, letters, fascias, stall-plates, etc., are shown at special position No. 5 by the Brilliant Sign Co., Ltd., of 38, Gray's Inn Road, W.C. This firm make a speciality of brilliant gold letters; word letters are also a feature of their work. In addition to their London office, they have branches at Manchester, Leeds, Birmingham, Sydney (N.S.W.), and Auckland (N.Z.), and they lay themselves out especially to cater for the trade.

A Special Paint and a Paint Remover.

At stand No. 33, row A, Messrs. C. Chancellor & Co., of 13, Clerkenwell Road, E.C., have an exhibit of "Velure" paint and "Stripso" paint remover. "Velure" is a perfect japan paint, with elastic properties, and is intended to dispense with varnishes, one coat only being required, as against the usual three. One gallon of "Velure" covers about 90 sq. yds. of a flat non-absorbent surface. It is made in over 100 shades. Its elastic quality is a great feature of this paint, as it does not crack on exposure to heat or weather, and, as can be seen at the stand, when applied to metal the latter can be bent and twisted without the paint in any way cracking. "Velure" has been extensively employed for hospitals, hotels, and by steamship companies. It can be used on iron, stone and plaster, as well as on wood. "Stripso" is simply applied with a brush to any old paint or varnish which it is desired to remove, and after being allowed to remain a certain time—from half an hour to two hours—merely requires washing off with cold water, the old paint being thus removed and the material being left bare for repainting. "Stripso" is also used by gas companies, as it is very convenient for removing grease from the enamel linings of gas stoves.

Hand-Power Winches and Scaffold Fasteners

Messrs. Hunt, Page & Stacey, of 86, Herbert Street, New North Road, Walworth, exhibit at stand No. 43, row A, their patent scaffold fasteners and hand-power winches. The scaffold fixer consists of an iron clamp used in conjunction with a chain, which is brought round the poles and screwed up tight with a nut, the whole operation being very easily carried out. These fixers, besides being easily applied, have the advantage over ordinary scaffold ropes, in that when once fixed they do not require to be touched again during the course of a job, whereas with ordinary scaffold ropes, which slacken under varying weather conditions, it is necessary to tighten up periodically. The winch shown is geared down to the strength of one man, and while being quite safe, is of quick action for raising materials, &c., on building works.



STACEY'S HAND-POWER WINCH.

Stained Glass.

At stand No. 42, row A, Messrs. Campbell & Christmas, of St. Oswald's Studios, West Brompton, S.W., exhibit a number of examples of stained glass executed by them, as well as some plain glazing. This includes some windows for church work, two of the windows shown being intended for a church at Bridgend, Glamorgan. Some examples of glazing for ordinary house work are shown, and another exhibit is some fire-resisting stained glass with wire embedded. A feature of interest at the stand is some glazing having a steel core running through the cames, in this way doing away with the comparatively heavy supporting iron bars which are usually employed in stained glass windows.

"Duresco."

One of the most permanent-looking erections in the exhibition is the stand of the Silicate Paint Co. (Messrs. J. B. Orr & Co.), of Charlton, S.E., who occupy special positon No. 15. It takes the form of a good-sized cottage, decorated inside and out with "Duresco," the well-known water-paint. The work is carried out in a variety of shades, and shows the various treatments to which "Duresco" is adaptable. Altogether this exhibit is a very effective one.

Ruberoid.

As a serviceable roofing in place of slates, tiles or iron, "Ruberoid" will be familiar to most visitors at the exhibition, nevertheless they should not fail to see stand No. 72, row C, where the Ruberoid Co., Ltd. (of 81-83, Knightrider Street, E.C.), have built up a gabled roof to illustrate the application of their material, with flats below having a brick wall on one side to show the use of "Ruberoid" both for flat roofs and as damp-course. This material has a high-grade felt as foundation, impregnated with a patented compound which renders it water, acid, alkali and weatherproof. It contains no tar, rubber, or asphalt, there is no evaporation or melting, it is easy to lay, and, once laid, needs no further attention; moreover, it is light in weight, does not crack nor leak, and is a non-conductor—qualities which recommend it for roofing; while, as damp-course, it is equally effective.

Architectural Joinery.

One might expect the exhibit of Mr. John P. White, of Bedford, to comprise those well-designed and well-executed mantels, panellings, and other architectural joinery with which his name is associated, but at stand No. 54, row B, we have only a reminder of these in the photographs that hang on the walls. This year Mr. White shows gates and garden furniture only, and the work exhibited is seen to be of the same careful character, and in the same good taste, which his other work displays; the garden seat and chairs being especially good; while there is also shown at the stand some specimens of treillage, which Mr. White makes a speciality of.

"Coatostone."

This is a special composition, which is applied like a paint to plaster, cement, wood, or other surfaces to produce the effect of natural stone, as may be seen at stand No. 5, row B, where the Coatostone Decoration Co., of 77, Mortimer Street, W., show it in a variety of treatments, a particularly effective application being for friezes in various tints. "Coatostone" weathers well, and acts also as a preservative of stone. Another exhibit at this stand is "Stone Stuc" on granite plaster and expanded metal, this, pointed with mason's joints, being an exact copy of stonework. Still another exhibit is "Sandisco"—a washable distemper that keeps its colour, and there is also shown some parquet flooring, exceedingly well laid and finished.

Glass Tiles.

The Hygienic Glass Co., Ltd., of 10, Basinghall Street, E.C. (stand No. 34, row A), exhibit a selection of their patent glass tiles and wall coverings, the tiles being laid as panels with some decorative Dutch friezes, also in glazed tile. These frieze tiles can be used with good effect as panels of wood mantels, &c. The work is effectively carried out.

Mr. Batsford's Exhibit.

Mr. B. T. Batsford has a stand at No. 57, row B, where his latest publications are exhibited, together with specimens of the many standard works relating to architecture and building which he has published in the past.

Door Furniture.

Mr. James Gibbons, of Wolverhampton, has an excellent exhibit of locks, latches, etc., at stand No. 51, row B, the work shown being well designed and carefully executed.

Waygood Lifts.

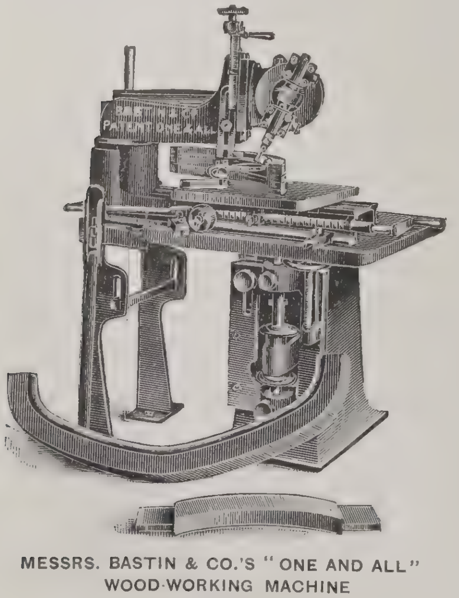
Messrs. R. Waygood & Co., Ltd., of Falmouth Road, S.E., occupy stands Nos. 77 and 78, row D. The most prominent exhibit here is a Waygood electric passenger lift working up to the level of the gallery, this lift being in a wrought-iron structure provided by Messrs. Richard Moreland & Son. Another exhibit is a model of a Waygood press-button passenger lift; this is a very useful form for buildings where it is not desired to keep a lift attendant, or for use when the attendant is off-duty, as by simply pressing a button the lift is set in motion, and travels to the floor to which it is desired to go, stopping there automatically.

A Patent Chimney Pot.

At stand 188, row L, in the annexe, Messrs. A. G. Preedy & Son, of 6, Market Place, Station Road, Wood Green, N., exhibit patent chimney heads and tall-boys in iron and earthenware. The form of these chimney heads is neat, and it is especially noticeable that they can be easily swept by ordinary means, and are not liable to damage, as many smoke-preventing pots are. Metal tops can be made to slip in an ordinary pot where such is in use. The earthenware pots made in terra-cotta and buff colour are bricked on.

Two ingenious Wood-Working Machines.

These are to be seen at wall space No. 158, where they are exhibited by Messrs. Bastin & Co., of 37, Queen Victoria Street, E.C. The one is a patent Elephant machine or attachment for vertical spindle machines—a cheap and efficient moulding machine having a universal swivel cutter spindle and capable of producing every kind of moulding work. The other machine is for trenching stair strings, &c., being very rapid in work and having various attachments for stop-chamfering, dovetailing, &c.



MESSRS. BASTIN & CO.'S "ONE AND ALL" WOOD-WORKING MACHINE

White Enamels and Standard Colours.

Messrs. Pinchin, Johnson & Co., Ltd., of 23-25, Billiter Street, E.C., occupy special position No. 7. Their stand is divided into two portions, one portion having a staircase treated with "Satinette" white enamel in two grades—glossy and matt: the quality of both these surfaces is remarkable, the glossy being of a very china-like finish, and the matt equally pleasing for certain classes of work. The makers claim that this white enamel keeps its colour, and judging by the work exhibited at the stand, some portions of which were done a long time ago, this clearly is the case. "Satinette" is easy of application, and for those who are desirous of obtaining a white enamel for good work it should be of great interest. The other portion of the stand is devoted to a display of "Minerva" paint. It will be recollected that a short time ago Messrs. Pinchin, Johnson, & Co., instituted a competition with the object of standardising colours, so that some specific shade should be known to correspond to the name commonly given to it. As the result of the competition, for which there were about 5,000 entries, Messrs. Pinchin, Johnson & Co. were able to build up their "Standard Colour Card," comprising 60 separate shades. The firm make a standard white, which they guarantee to be composed of absolutely pure materials, and in conjunction with this they supply 20 standard shades of colour, each of which when mixed with a definite amount of the white gives a colour which the decorator can determine from the beginning. Another exhibit at this stand is "Deydo" cold-water paint, this forming a washable distemper for interior and exterior work.

"Manu-Marble."

As the name implies, this, at stand No. 153, wall space, is an exhibit of manufactured marble, in flooring, dadoes, tiling, &c., &c. The manufacturers are the Manu-Marble Co., Ltd., of 118, Queen Victoria Street, E.C., who guarantee their material to stand climatic changes, frost or heat. It can be used wherever marble is suitable, and is a very close copy of the original, the markings going right through, and the surface bearing a high friction polish. The material is well keyed on the back and thus is easily fixed, while, as regards cost, the manufacturers state that, though only slightly more expensive than tiles, the effect is equal in every way to marble itself.

Sirapite.

Specimens of this well-known plaster on a number of surfaces—brickwork, lathing, &c.—and with various finishes, are shown at stand No. 123, row G, by the Gypsum-Mines, Ltd., of Mountfield, Robertsbridge, Sussex, while a prominent feature is a Corinthian doorway in alabaster, this being a facsimile of the drawing-room doorway at Keddleston Hall.

The Nautilus Fire.

The particular feature of this fire is that it stands on the hearth in front of the chimney opening. There is no outlet into the chimney above the grate, but at the back near the top, and the upper portion of the fire is rounded to deflect the heat in this way, and so secure a maximum radiation into the room, instead of wasting heat up the chimney. Numerous varieties of these fires can be seen at bay 8, where they are exhibited by the Nautilus Fire and Heating Co., of 34, Berners Street, W.

A Good Exhibit of Tiles and Faience.

Messrs Carter & Co., of Poole, Dorset, have a large stand in the annexe, where they show specimens of their various productions, including floor tiles, mosaics of all kinds, terrazzo, marble and keramic-glazed wall and hearth tiles, terra-cotta, and faïence. Especially to be noted are the fireplace interiors, with wood mantels, built up of briquettes with faïence hobs and arch bricks, glazed hearth and kerb to match. This is a class of fireplace which Messrs. Carter supply in many varieties. Their special exhibit this year, however, is a large selection of glazed tiles for decorative purposes, fireplace and furniture panels, and dadoes. Many of these are in the "leadless glazes" to which so much attention has recently been called.

Special Paints and Enamels.

Messrs. R. Gay & Co., Ltd., of Stratford Market, E., have erected at No. 129, row G, a wooden hut painted inside and out with their "Impenetrable" varnish paint (which is free from obnoxious smell, and dries with a high gloss), having panels of "Etruscan" paint (which is a cheaper form of the first-named) and "Tegoline" enamel, this last being particularly suited for high-class decorative work, and obtainable both glossy and matt.

The Devon Fire.

Messrs. Candy & Co., Ltd., exhibit at special position No. 12 a large number of patterns of their "Devon" fire. Readers will perhaps recollect that some time ago we illustrated and described this fire in connection with the tests which were carried out conjointly by H.M. Office of Works and the Smoke Abatement Society in the new Government offices at the lower end of Whitehall; in which tests the "Devon" fire was placed first. It is very carefully designed, consisting of a bottom and back in two pieces of fire-clay, arranged as to give slow combustion, and the back of such shape as to throw out a maximum of heat. The "Devon" fire is very neat and, as shown by the exhibits at this stand, is supplied in a great number of types to suit different tastes and requirements, the hearth and surrounds being in glazed briquettes or tiles with wood mantel, copper canopy or any other kind of finish. Messrs. Candy & Co. also exhibit glazed bricks, glazed terra-cotta, vitrified engineering bricks, &c., &c.

Hand-power Lifts.

A very useful hand-power lift is shown at stand No. 122, row G, by Messrs. Hammond & Champness, of Alfreton Street, S.E. The special feature of this is that it is fitted with two-speed gear. By this means a heavy weight can be safely taken up at a slow speed, and, afterwards, by simply pulling a cord, the gear can be changed and the cage returned at a quick speed. Such a lift is of course adapted for a variety of purposes, but for builders it will have a special application.

Ratner Safes.

There is a great display of these by the Ratner Safe Co., Ltd., at stand No. 52, row B. The body is bent at all twelve corners out of one solid steel plate, and does not depend on any screws or rivets. The safe therefore is as strong as it is possible to conceive.

A NEW CONCRETE MANUFACTORY.

An interesting factory for the manufacture of moulded concrete in various forms has recently been erected at Strood, Rochester. It embodies several new features for a works of such class, and is distinctly novel in general arrangement. The whole building and plant have been exceptionally well thought out, and we therefore illustrate the arrangement.

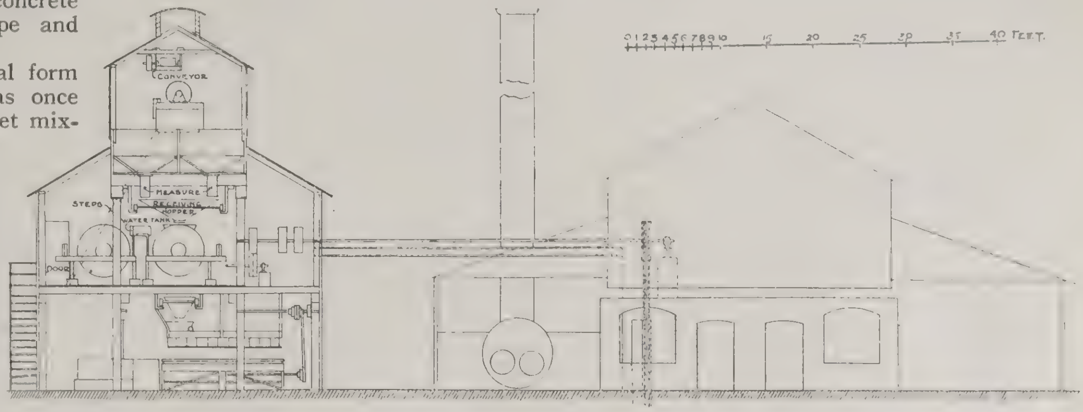
These works of the Improved Construction Co., Ltd., whose head office is at 47, Victoria Street, London, S.W., have been erected primarily to work a new patent process for the manufacture of moulded concrete articles. This process was invented by Mr. P. B. Jagger, who has studied the manufacture of concrete for many years past in Europe and America.

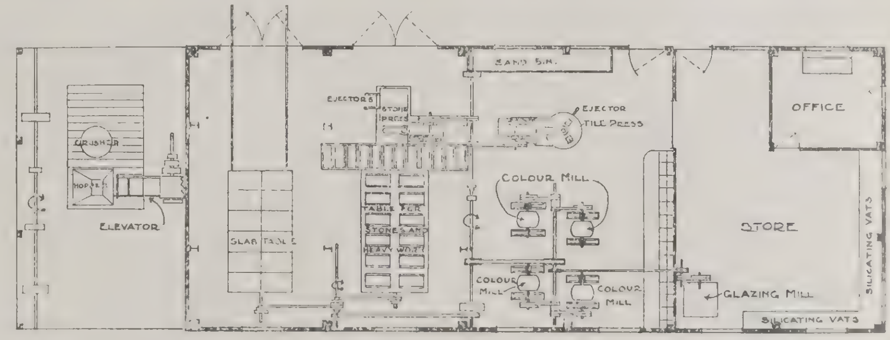
The process consists of a special form of shaking table. Concrete was once moulded entirely by hand from wet mixtures. To this succeeded the use of dry mixtures, which were heavily rammed by hand. Machines for pressing or ramming the dry concrete into moulds were of recent introduction, and were a considerable advance on former methods in that they enabled moulds to be speedily released. They had the disadvantages, however, of not giving such a compact structure, and of affording concrete short in grain.

In the old hand process of moulding with a wet mixture of concrete there was a difficulty of getting air bubbles out of the mixture, and a thin cement face marked with air bubbles always appeared upon the surface, which was expensive to render of fair appearance—*i.e.*, it had to be filled with a cement grout, plastered or rubbed down. In order to get the air bubbles from the mixture and render the face more even the moulds were rocked up and down and shaking tables were introduced, but these generally worked the cement up to the top and segregated the aggregates and cement.

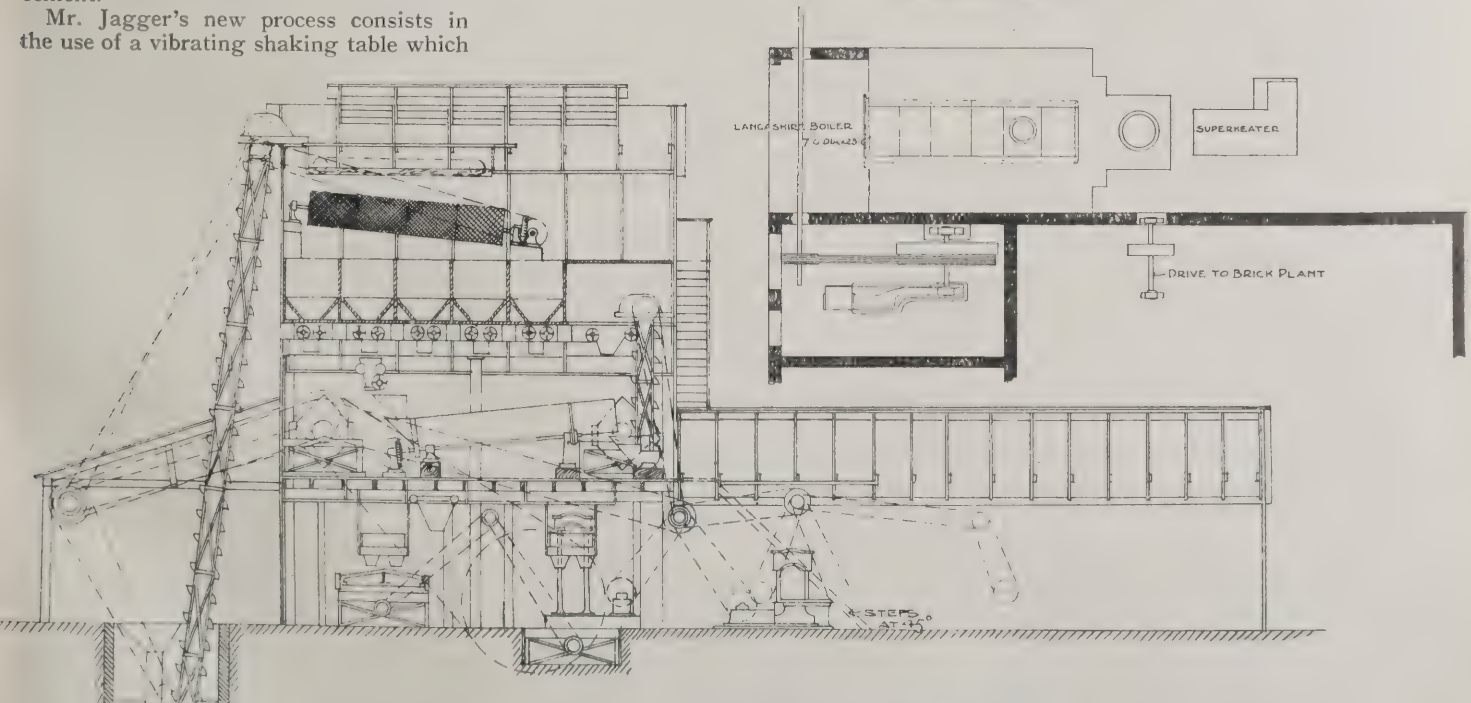
Mr. Jagger's new process consists in the use of a vibrating shaking table which oscillates in four directions, resulting in the material moving only vertically, thereby wedging the aggregate together and producing a very hard and compact concrete without the slightest void, removing all air bubbles, and working the aggregate right to the face, which is left perfectly smooth. Excess moisture is thrown off from the moulds, and the blocks become hard almost as quickly as they do in the dry process. The moulds can thus be speedily released, and the concrete is ready for handling much sooner. The process is undoubtedly a great improvement on former methods of manufacture.

The first works erected at Rochester have been designed to embody as much science in the manufacture of concrete as possible, together with economy of power and labour. All the materials are firstly received at the point where the crusher is placed; the sand and cement are shot into the hopper and the larger aggregate into the crusher; a bucket elevator conveys these materials to the top of the building, where the larger aggregate is sifted by a rotary screen into bins, and the sand and cement also delivered into other bins. On the floor below a trough-shaped traveller runs the length of the building under the bins and receives the proper proportions of aggregate and cement. If the aggregate





GROUND PLAN


LANCASHIRE BOILER 7' 0 DIA x 25'
SUPERHEATER
DRIVE TO BRICK PLANT
STEPS AT 45°
0 1 2 3 4 5 6 7 8 9 10 15 20 25 30 35 40 FEET

LONGITUDINAL SECTIONAL ELEVATION

NEW CONCRETE-MOULDING WORKS OF THE IMPROVED CONSTRUCTION CO., LTD., AT STROOD, ROCHESTER, P. B. JAGGER, ENGINEER.

needs washing it is discharged into a rotary washer. The traveller carries the materials to a rotary mixer for wet concrete at one end, and a rotary mixer for dry concrete at the other end. From either mixer the mixture is discharged into another travelling hopper on the ground floor, and from this the mixture is discharged into moulds standing on the shaking tables. From here the moulds are run on trolleys into the drying sheds. In conjunction with one of the shaking tables there is a press which will mould dry concrete in the ordinary way, and which is used for putting a face upon a concrete block that has been wet moulded, such as for imitating roughly dressed stone blocks. Behind the shaking tables there are presses for the manufacture of sand and cement tiles.

Some further particulars will be found elsewhere in this issue.

Correspondence.

High Grain Bins.

To the Editor of The Builders' Journal.

Sir,—We have read the interesting reply in reference to high grain bins in your issue for March 27th, but we cannot quite agree with the theory put forward by Professor Adams. Though the pressures on the side walls are very great indeed, they are not so great as pressures caused by fluids. Grain behaves like a semi-fluid, and owing to internal and side-wall friction there are formed suspended cones which, roughly, reduce the pressure to about a third of that which would be caused by a fluid. We would suggest that the bins should be made round, as this section will not be stressed like straight walls. As to the material, we find that perforated bricks will show about 3-5 times greater resistance against horizontal thrust than ordinary bricks, and this has been confirmed by the Charlottenburg Testing Institute. Of course, the walls can be accordingly thinner than in the case where ordinary bricks are used, and the construction will be proportionately cheaper. We have also tried reinforced concrete for bins, and the results are very satisfactory when the bins are erected by experienced people working with the necessary pneumatic outfit.—Yours truly,

The Ferbeck Chimney
Construction Co.

London.

To the Editor of The Builders' Journal.

Sir,—With regard to question on high grain bins on p. 144 of your issue for March 27th, querist will find some information on the subject in Vol. 77, 1884, Minutes Inst.C.E., in an article by Woodford Pilkington, M.I.C.E., on the "Elevation, Storage and Shipment of Grain."

In the absence of specific information I cannot give very definite advice, but I am of opinion that the brick walls referred to should not be used to hold the grain, but a "cribwork" structure be erected inside of, say, 7-in. by 2½-in. battens *on flat* reduced to 5ins. by 2ins. towards top, spiked together with 6-in. by ¼-in. steel spikes at 15-in. to 18-in. centres, half checked at all intersections, and to have bevelled fillets at offsets and a space of 15ins. to 18ins. left between cribwork and walls for screwing up washer bolts and general inspection. The tie-rods to be 1in. diameter, 8 to 10ft. apart horizontally and 4ft. vertically. These figures differ materially from Prof. Adams's, which may be correct theoretically, but are not so practically. They are based, however, on experience, and may be relied on. Your enquirer makes no mention of the silo sub-structure, which it is essential to take into account when designing these structures: if he goes on his proposed methods disaster will overtake him.—Yours truly,

Aberdeen. H. C.

To the Editor of The Builders' Journal.

Sir,—The only comparison I can make between my figures and the above is in the diameter of tie-rods. For the same supported area your correspondent gives a general diameter of 1in., while my sizes based upon calculation vary from ¾in. at top to 2ins. at bottom. If hopper bottoms are required with space below, the pressure will be reduced, and 1½ins. diameter would probably be the largest tie required. I do not understand a thing being correct theoretically but not practically, and the article upon grain bins referred to is for new timber structures, not the adaptation of an old brick building.—Yours truly,

Henry Adams.

Sunderland Children's Hospital Competition

To the Editor of The Builders' Journal.

Sir,—Our attention has been drawn to a letter in your issue for March 20th commenting on our design for the above. If your correspondent will kindly refer to the reproduction of our design which appeared in the "Building News" for March 22nd, he will see that our levels were not "faked." His error is quite justifiable, but the responsibility rests with your artist, and not with us. At the same time may we point out that this same artist has taken other liberties with our elevation, which will certainly lead competitors to believe, with your correspondent, that our design was not straightforward. Evidently our elevation was not to your artist's liking, and his artistic sense has led him into untruthfulness.—Yours truly,

Armstrong & Wright.

Newcastle-on-Tyne.

To the Editor of The Builders' Journal.

Sir,—Regarding the review of the above competition, and the letter of your correspondent "S," the elevations illustrated in the issue for March 13th are correct in the levels, though only the finished or made-up ground-level is shown in comparison with a datum line. The natural ground-level would be about 5ft. above finished ground line at the extreme west of the two wards, and the former quickly meets the ground line shown in the drawing. The 16ft. of difference is therefore accounted for thus: 11ft. from datum level to finished ground level and 5ft. higher to present ground level. Although the sketched elevations do not show the present slopes, yet it is very evident they have been omitted by the level plateau in front of the two wards, which breaks the continuous line, and proves itself to be made up and the finished ground level. From a careful examination of the drawings it was very evident that the levels had been most accurately worked out, and there is not the least ground for your correspondent's remarks about "faking" the levels.—Yours truly,

W. Edwardes Sproat.

Liverpool.

[On comparing the elevations published by us with those which appeared in our contemporary the "Building News" for March 22nd we find that the finished ground lines and the datum level scale the same, only the present ground level is shown in comparison with the finished ground line in the latter illustrations. The foregoing letter practically replies to the difference in levels mentioned by our correspondent "S.". We have also compared our artist's sketch, and we fail to see any difference from the competition set beyond shadows to break up the severe architectural lines. The writer of the critique favourably commented on the elevations, particularly on the way in which the sun-houses, iron railing and corridors had been tied into the main building.—Ed. B.J.]

Our Plates

"Miyanoshta," Kilmacolm.

This house is built on a rough hillside which has a little burn running through it. The back of the ground is steep and adjoins the Golf Course. The house was therefore kept well up, and a small marsh in front of it was drained, and now forms the vegetable garden. Still further in front a level lawn is formed, elliptical in plan. Old dry stone dykes were left, and a famous local well was arched over in the retaining wall which holds up the entrance drive. The arrangement of the house is shown by the plans. The architects were Messrs. Salmon & Son and Gillespie, of Glasgow.

Municipal Buildings, Crewe.

These fine buildings were completed some time ago, and must be counted among the best work of the architect, Mr. Henry T. Hare, F.R.I.B.A. The treatment of the front is dignified and massive, while the planning of the buildings is very economical and straightforward.

Obituary.

Mr. James Longden, the well-known building contractor of Sheffield, died on March 27th, aged 60. His father, Mr. George Longden, founded, about the year 1853, the building and contracting business now carried on at Neepsend under the title of George Longden & Son, Ltd. When Mr. James Longden was quite a lad he became associated with the business, and on attaining his majority he was admitted to partnership. Mr. Longden was never a man to confine his business outlook to one district, so that while busily employed at Sheffield he was always ready to take a contract in any part of the country, and under his management the firm's connection widened greatly. Among other jobs carried out by the firm may be mentioned the large new asylum at York, the reconstruction of Paragon Station, Hull, new buildings for the Prudential Assurance Co. at Brighton and at Sheffield, and for the Sun Office at Hull, reconstruction of the Midland Station at Sheffield, &c.

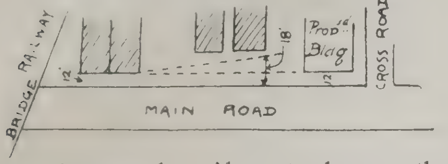
The Royal Hippodrome at Belfast has just been completed at the corner of Grosvenor Road and Great Victoria Street, from designs by Mr. Bertie Crewe, of London. It provides seating accommodation for nearly 3,000 persons.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.
The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.
Correspondents are particularly requested to be as brief as possible.

Building Line.

HAMPTON WICK.—W. T. writes: "I shall be glad to have an opinion in regard to a building line described below. I maintain that a 12ft. building line is already established, whereas the District Council, to whom I have submitted plans, maintain that it takes the oblique direction across the fronts of the houses already erected. About twelve months ago a case was tried by Mr. Justice Wills in which his decision was, that a building line was established by the distance of a building from the road, and not by the oblique direction that some buildings take."



You should have stated the distance to which the building on the other side of your proposed new premises (and beyond the cross street) is set back. The oblique line suggested is pure nonsense, as the houses you show as being 12ft. back do not affect your building at all. Presuming your sketch shows all the circumstances, and that no houses are yet erected beyond the "cross road," you cannot build nearer to the "main road" than 18ft. (except with the permission of the local Sanitary Authority), this being the distance to which the houses immediately adjacent are set back. The case to which you refer merely affirmed Section 3 of the "Public Health Act, 1888":—"It shall not be lawful in any urban district, without the written consent of the urban authority, to erect or bring forward any house or building in any street, or any part of such house or building, beyond the front main wall of the house or building on either side thereof in the same street, nor to build any addition to any house or building beyond the front main wall of the house or building on either side of the same."

F. S. I.

Non-Payment of Moneys under Contract.

CREDITON.—PERPLEXED writes: "I should like your opinion in regard to the non-payment of money due to me on carrying out a large contract. The job was one where quantities formed the basis of the contract. Upon measurement the contract sum was found to be exceeded by more than £2,000. The architect has made no effort to measure up the work, and in order to prepare my account I employed an independent surveyor, and have rendered an account in accordance with his figures. The architect does not repudiate or dispute this, but simply ignores repeated appeals for payment. There has been no question as to inferior work on my part; on the contrary, the architect and the owner have expressed complete satisfaction. What steps do you recommend me to take to get the matter settled? I am naturally averse to litigation in any form."

If you are unable to obtain either "yea or nay" from the architect, would it not be judicious to approach the employer for whom you executed the work, asking for a settlement in accordance with the contract? Should that not solve your difficulty, I fear that you have no course but to proceed by legal action (in the manner prescribed by the contract). Consult your solicitor *before* you take any decided steps.

F. S. I.

Darkening a Red Tiled Roof.

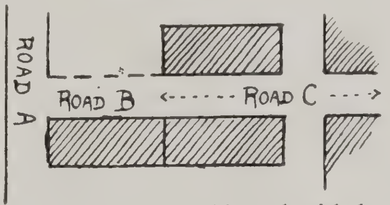
SUTHERLAND writes: "Do you know of any solution and where it can be procured for applying to a red-tiled roof to darken the colour of the tiles permanently? They are too bright at present."

If it is proposed to treat with a darkening solution tiles already laid on a roof, it is to be feared that the case is hopeless. In any event, tiles artificially coloured never present the satisfactory appearance which results from natural weathering, and in this particular instance it is only possible to recommend patience, to allow the weather to take effect. If the tiles are reasonably porous this should quickly happen; if they are not so, it is probable that they would not absorb a sufficient quantity of any darkening solution to produce the desired effect. Mr. J. J. Elridge, of Bethnal Green Road, London, E., supplies tiles made at Rettendon, Essex, and known as "smut-faced," which have quite the appearance of old tiles. They appear to be darkened by artificial means, but it is probably done during manufacture. Enquiries might, however, be made in this direction, or of Messrs. J. K. Cooper & Sons, Maidenhead, Berks.

G.

Taking over of Roads by Local Authority

OMEGA writes: "Referring to the accompanying sketch, road A is a public highway repairable by the public at large; road B is an old road with houses built on one side only, but it has not been taken over by the local authorities, as same has not been properly kerbed, channelled, paved, &c.; road C is a new road with 20 houses built on each side. This road C has now been kerbed, channelled, paved, metalled, lighted, &c., and is in proper condition to be taken over by the local authorities and to be declared a public highway. Can the local authorities refuse to take it over on the ground that road B is not in such condition as to be taken over? The owners of the property abutting on road B are not willing to go to the expense of doing this. The owners of all the houses abutting on road C are anxious to have their road taken over and declared public. If the Council refuse to take over road C, can they be compelled to do so under the Public Health Act?"



Assuming that the road marked B forms the only access to the portion marked C, I am of opinion that not only *may* the local sanitary authority refuse to take over the new road C, but that they almost certainly *will* so refuse. To all intents and purposes, the roads you mark B and C form one street.

F. S. I.

Notes and News

A bridge is being erected across the widened Charles Street from the new Government buildings in Whitehall to the Home Office.

Whitewashing Westminster Abbey. — Under Prof. Lethaby's direction the east cloister of Westminster Abbey has been limewashed as an experiment in preserving the stonework.

Crack in Exeter Cathedral Tower.—An extensive crack has appeared in the south tower of Exeter Cathedral. It is stated, however, that there is no cause for alarm.

Sir A. Brumwell Thomas has served a writ for £13,000 on the Belfast Corporation for balance of fees claimed on the new City Hall built from his designs at a cost of £350,000.

The Guild of Handicraft, Ltd., have been entrusted by Mr. E. W. Allfrey, architect, of Oxford, with the production and fixing of an oak screen and stalls at St. Helen's Church, Abingdon; also some special carving work, including a 2ft. 6in. figure of Madonna and Child, and a similar one of St. Michael, for oak reredos in Urswick Parish Church, under the instructions of Messrs. Settle & Brundrit, architects, of Ulverston.

The Old Pavement Houses, York, are being removed to a site near the old archway in Deangate. The structure will face the Cathedral Church, and a picturesque quadrangle will thus be formed round the grass plot on which formerly stood the Church of St. Cuthbert. Mr. Temple Moore has charge of the work. It seems probable that the houses date from the early part of the 15th century.

The Rebuilding of Regent Street Quadrant—Replying to a question in Parliament recently, Mr. Runciman said that, as leases fell in, it was intended to rebuild the whole of Regent Street Quadrant as one consistent scheme after the same design as that of the building now being design as that of the building now being it was too late now to make any alteration in consideration of views of lessees and others, even if any such could be shown to be desirable.

The Question about Holyrood Chapel.—Mr. W. T. Oldrieve, Chief Architect to H.M. Office of Works, Scotland, considers that all parties interested should unite in a common effort to have the tower, choir, and transepts of Holyrood Chapel built as an entirely new building, the ancient nave forming a dignified approach, and every effort being made to preserve what remains of it from further decay.—A joint committee of master builders in Edinburgh and Leith have drawn up a report in regard to the condition of Holyrood Chapel and the proposed restoration. In this report they state that "no question of weakness or instability in respect to the existing walls can be seriously entertained; that restoration of the chapel can with safety be effected, and would permanently secure the preservation of these walls; and that with careful handling a structure could be produced worthy of the historic memories attaching to this ancient chapel."

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Barnard Castle.—Accepted for painting detached residence, Park House, for F. W. Raper, Esq. Mr. T. Farrow, architect, 7, Market Place, Barnard Castle:—

G. W. Jackson, Horse Market, Barnard Castle.

Duffryn Rhondda (near Port Talbot).—For the erection of winding engine-house for the Duffryn Rhondda Colliery Co., Ltd. Mr. Frank B. Smith, M.S.A., architect, Port Talbot:—

John Davies, Aberavon	£1,646	0	0
St. Rees, Aberavon	1,523	13	8
Anderson & Vaughan, Aberavon	1,501	10	3
Morgan Cox, Port Talbot	1,498	0	0
W. P. & E. Williams,* Port Talbot	1,448	0	0

* Accepted.

East Adderbury.—For the construction of sewerage works, for the Banbury R.D.C. Messrs. Willcox and Raikes, engineers, 63, Temple Row, Birmingham:—

Contract No. 1.

W. J. Bloxham, Banbury	£5,140	0	0
H. H. Barry, Radcliffe-on-Trent	4,916	12	6
J. F. Booth & Son, Banbury	4,850	0	0
R. Bowen, Leamington Spa	4,810	0	0
G. Orchard & Son, Banbury	4,697	0	0
J. S. Kimberley, Banbury	4,400	0	0
Rowell & Sons,* Chipping Norton	4,282	18	10
F. Mirchell & Son, Manchester	4,113	11	6
J. Riley, Cheltenham	3,999	7	10
J. H. Macdonald, Oxford	3,896	8	0
W. Westwood, Bromyard	3,741	19	10

* Accepted, the contractors originally selected having declined to proceed with the work without extra payment for rock excavation.

Great Yarmouth.—For building and decorative work at King Street Congregational Church. Messrs. George Baines & Son, architects, 5, Clement's Inn, Strand, London, W.C.:—

Builders' Work:

	Est. No. 1.	Est. No. 5.
Geo. Chasteney & Co.,* Regent Passage, Gt. Yarmouth	£57 0 0	£19 0 0

Decorative Work:

	Est. No. 2.		
J. E. Dyson	£388	18	0
W. J. Rushmer	198	0	0
J. T. Goffin,* 58, King Street, Gt. Yarmouth	192	0	0

* Accepted.

Great Yarmouth.—Accepted for improvement at "Palmer's." Messrs. George Baines & Son, architects, 5, Clement's Inn, Strand, London, W.C.:—

Mantle Showroom, Workshops, &c.:

James Leggett, 39, Dene Side, Great Yarmouth ... £2,310 0 0

New Boot Room and Men's Offices:

James Leggett ... £474 6 11

Hartshill.—For the erection of Conservative Club. Mr. Ernest E. Shepherd, architect, New Bridge Street, Nuneaton:—

Moss & Ellis	£649	10	0
Thomas Smith	605	0	0
Thomas Wincott	580	17	0
W. Green	570	0	0
H. Whitehead *	569	14	3

* Accepted.

London, S.E.—For the construction of a 4ft. by 2ft. 8in. brick and concrete sewer in Sydenham Road, for the Lewisham B.C.:—

Greig & Matthews	£9,810	0	0
T. Watson, jun.	8,175	0	0
W. Muirhead & Co.	7,342	0	0
J. Mowlem & Co.	6,924	0	0
Johnson & Langley	6,554	0	0
G. Bell & Sons	6,193	0	0
Kelletts, Ltd.	6,180	0	0
W. Pearce	5,800	0	0
H. Woodham & Sons	5,776	0	0
J. Moran & Son	5,700	0	0
Fry Brothers	5,698	0	0
E. Iles, jun.*	5,559	10	0

* Recommended for acceptance.

Cwmdu.—For the erection of new Council school. Mr. W. D. Jenkins, M.S.A., M.R.San.I., county education architect, Carmarthen:—

Thomas Brothers, Llandilo	£998	0	0
Evan Evans, Llanybyther	868	0	0
Watkin Davies, Llanybyther	825	0	0
D. Howells & Son, St. Clears	812	0	0
Rees Thomas, Llansawel	745	0	0
E. H. Williams, Llandovery	740	0	0
Walter Thomas,* Llandilo	689	0	0

* Accepted.

Sawley (Derby).—For the construction of sewerage and sewage-disposal works, for the Shardlow R.D.C. Messrs. Willcox & Raikes, engineers, 63, Temple Row, Birmingham:—

W. Sharp & Sons, Barton-under-Needwood	£9,843	0	0
H. H. Barry, Radcliffe-on-Trent	9,630	0	0
E. Tabor, Cambridge	9,278	7	7
Johnson & Son, Salford	8,820	4	7
J. Byrom, Ltd., Bury	8,816	0	0
J. S. Dawson, Blackpool	8,564	9	1
Johnson & Langley, Leicester	8,550	0	0
Lane Brothers, Mansfield	8,507	16	0
O. Wright & Co., Leicester	8,402	5	0
E. Bentley & Son, Leicester	8,180	8	0
T. Smart, Nottingham	8,177	15	1
Ward & Tetley, Bradford	7,988	5	0
W. Cunliffe, Birmingham	7,969	0	0
A. K. Oakes, Buxton	£7,959	4	5
W. G. Wilmott, Rushden	7,839	0	0
Firth & Co., York	7,555	19	3
Lock, Andrews & Price, Nottingham	7,750	0	0
A. J. Cottle, Sutton-in-Ashfield	7,722	9	9
J. Thraves & Son, Stapleford	7,718	19	3
H. Ashley, Mansfield	7,698	0	0
A. Braithwaite & Co., Leeds	7,639	8	8
A. Jewell, Market Harborough	7,500	0	0
H. Vernon, Derby	7,413	0	0
T. H. Harper, Carlton	7,400	0	0
J. & J. Warner, Mickleover	7,373	0	0
Beighton & Berry, Chesterfield	7,294	15	0
W. Doleman, Dewsbury	7,112	16	3
G. F. Tomlinson,* Derby	7,075	0	0
T. Cuthbert, Nottingham	6,750	0	0

* Accepted.

Current Market Prices.

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	95	0	0	96	0	0
Do. Strong sheets	do.	118	0	0	119	0	0
Lead, soft foreign	do.	19	10	0	19	12	6
Do. English	do.	19	15	0	19	17	6
Do. pipes	do.	22	10	0	22	15	0
Do. sheets	do.	22	0	0	22	5	0
Galvanised Corrugated sheets	do.	13	12	6	13	15	0
Spelter G. M.	do.	25	17	6	26	0	0
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	7	17	6	8	0	0
Marked bars, Staffs.	do.	9	0	0	9	2	6
Common bars, do.	do.	7	5	0	7	10	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	17	6	7	0	0
Angles, Midlands	do.	7	0	0	7	5	0
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	181	0	0	182	0	0
Do. English ingots	do.	185	0	0	185	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

		£	s.	d.	£	s.	d.
Deals, Abo., Yellow, unsorted, 3×4	per std.	9	0	0	9	5	0
Do. do. do. do. 2½×7	do.	9	0	0	9	5	0
Do. Archangel, Yellow, 2nd, 3×9	do.	14	15	0	15	10	0
Do. do. do. 3rd, 3×9	do.	9	0	0	9	5	0
Do. do. do. do. 3×8	do.	10	5	0	—		
Do. do. do. 4th, 4×11	do.	10	5	0	—		
Do. do. do. do. 3×9	do.	10	0	0	—		
Do. do. do. 5th, 3×11	do.	8	0	0	—		
Do. do. do. do. 3×9	do.	8	0	0	—		
Do. do. White, 2nd, 3×11	do.	12	10	0	12	15	0
Do. do. do. do. 3×9	do.	9	10	0	10	0	0
Do. Aryd, Yellow, unsorted, 2½×7	do.	9	0	0	—		
Do. Borga. do. do. 3×5½	do.	9	0	0	—		
Do. Constantza, White, 2nd, 3×11	do.	10	5	0	—		
Do. do. do. 3rd, 3×9	do.	8	5	0	—		
Do. Hernosard, Yellow, 4th, 3×9	do.	9	15	0	—		
Do. do. do. Inf., 5th, 3×9	do.	8	0	0	—		
Do. Halifax, White, unsorted, 3×7	do.	7	15	0	—		
Do. Keret, Yellow, 3rd, 3×9	do.	10	5	0	—		
Do. Montreal, Bright Pine, 1st, 3×10	do.	24	10	0	—		
Do. do. do. do. 3×7	do.	22	0	0	—		
Do. do. Bright Spruce, 2nd, 3×9	do.	9	5	0	—		
Do. Mesane, White, 1st, 3×9	do.	11	15	0	—		
Do. do. Yellow, 3rd, 3×9	do.	10	15	0	—		
Do. Nederkalix, Yellow, 1st, 4×9	do.	11	10	0	—		
Do. do. do. do. 3×9	do.	11	5	0	—		
Do. do. do. do. 2½×7	do.	10	15	0	—		
Do. Norrkoping do., 1st & 2nd, 2½×7	do.	9	10	0	—		
Do. Quebec, Spruce, 1st, 3×8	do.	12	0	0	—		
Do. St. John, Bright Spruce, 1st, 2nd & 3rd, 3×9	do.	8	10	0	—		
Do. do. do. do. 3×7	do.	7	15	0	—		
Do. Soroka, Yellow, 1st, 3×9	do.	20	0	0	—		
Battens, Abo., Yellow, unsorted, 2×6	do.	8	15	0	—		
Do. do. do. do. 2×5	do.	8	5	0	8	10	0
Do. Archangel, Yellow, 2nd, 2×9	do.	15	0	0	15	5	0
Do. Borga, Yellow, unsorted, 2½×6	do.	7	15	0	—		
Do. Blankaholm, Yellow, 1st, 2×7	do.	9	10	0	—		
Do. Kooda, Yellow, 3rd, 2×9	do.	11	0	0	—		
Do. Sappvik. Yellow, unsorted, 2×5	do.	8	10	0	8	15	0
Do. Langrov, Yellow, unsorted, 2×6	do.	9	10	0	9	15	0
Do. Lovisa, Yellow, unsorted, 2×9	do.	9	15	0	—		
Do. do. do. do. 2×6	do.	8	15	0	—		
Do. Norrkoping, Yellow, 1st & 2nd, 2×7	do.	9	5	0	—		
Do. Nordmaling, Yellow, 5th, 2½×6½	do.	5	15	0	—		
Do. Skelleftea, white, unsorted, 2×5	do.	7	0	0	—		
Flooring Boards, Fredriksstad, Yellow, 3rd, 1×7	do.	0	10	0	—		
Do. do., Yellow and White, 1×7	do.	0	8	0	—		
Do., Gefle, Yellow, 2nd, 1¼×7	do.	0	13	0	—		
Do., do., do., 1¼×6	do.	0	13	9	—		
Do. do., do., 2nd. 1×7	do.	0	11	3	0	12	0
Do. Mo, yellow, 2nd, 1×7	do.	0	11	9	—		
Do., do., do., 3rd, 1×7	do.	0	10	6	—		

Bankruptcies.

J. T. Ruffell, builder, Hockley. R.O., March 27.

Dunton & Lawrence, builders, Bromley. Adj., March 26.

J. F. C. Bell, architect, London. R.O., March 26.

A. Mann, builder, Croydon and London. R.O., March 27.

W. Worsfold, builder, Eastbourne. R.O., March 26.

W. Pettifer, builder, Melton Mowbray. Liabilities, £493; assets, £320.

W. E. Hunter, builder, Hull. Gross liabilities, £14,357; £13,915 fully secured.

W. & I. Bennett, builders and contractors, Montpelier and Bristol. R.O., March 27.

H. Baxter, builder and contractor, Mansfield. P.E., Nottingham C.C., April 19, at 12.

W. Grime, builder and estate agent, Bolton. Gross liabilities, £4,409; £4,000 secured.

Dickinson & Kirkham, architects, civil engineers and valuers, Bolton and Cleveleys. R.O., March 27.

T. C. Mansfield, plumber and painter, Church Gresley. P.E., Burton-on-Trent C.C., April 17, at 12.

F. A. Young & Co., joiners and builders, Stevenage. Gross liabilities, £2,068; assets, £672; deficiency, £631.

T. Singer, builder, London. First meeting, Bankruptcy Court, April 12, at 12. P.E., same, May 7, at 11. R.O., March 25.

H. Metcalf & T. R. Greig, architects and surveyors, 11, Serjeant's Inn, Fleet Street, E.C. Liabilities, £104,436; assets, uncertain.

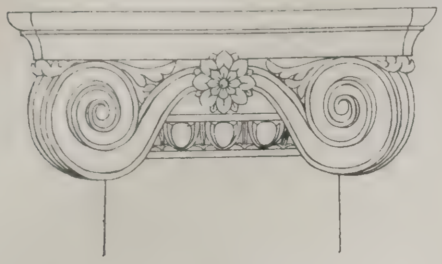
SMALL SEWAGE INSTALLATIONS.

At the last meeting of the Edinburgh Architectural Association Dr. Gilbert J. Fowler, of Manchester, gave a lecture on "Some Principles Underlying the Design of Small Sewage Installations." Discussing tank construction, he said it appeared safe to assume that the sewage of each person diluted to 20 gallons per head should receive 16 hours' tank treatment. As to the problem in connection with tank construction of irregularities in flow, Dr. Fowler mentioned some special features that had been embodied in works carried out for the Admiralty at Shotley, near Harwich. To cope with the fluctuations in population, the tanks were constructed in sections, each large section being capable of dealing with the sewage from 600 people, and when the population dropped in holiday time to about 100 an arrangement was made whereby the exit chamber of one of the tanks could be used separately, the larger tank being flushed out with clean water. Dealing with bacteria beds, he explained the construction and working of contact beds and continuous filters, and said that in a complete installation of contact beds no bed should be of a size greater than would allow of its being filled and emptied within a period during which aerobic conditions were maintained. As a rule, this should not exceed four hours. Frost, he said, was less likely to be feared with contact beds than with continuous filters. His experience in regard to continuous filters and mechanism generally in relation to frost led to the conclusion that the essential condition to be observed was to keep the sewage always moving.

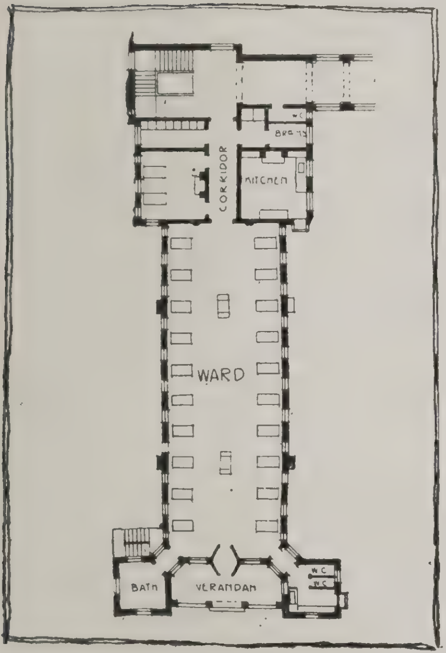
ARCHITECTURAL DIS-ORDERS COMPETITION.

(Tenth Series.)

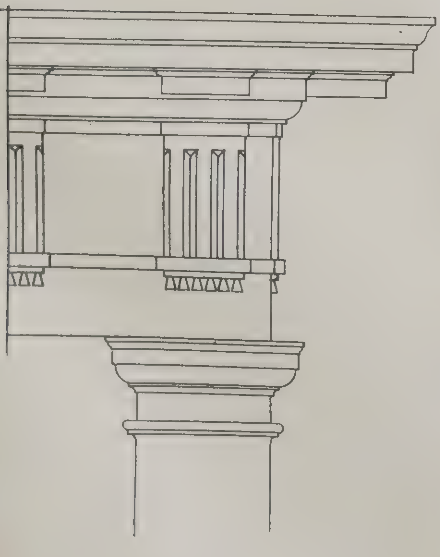
CLASS A (ARCHITECTURE).



A 25



A 26



A 27

This competition has been instituted with the object of increasing the circulation of The Builders' Journal by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

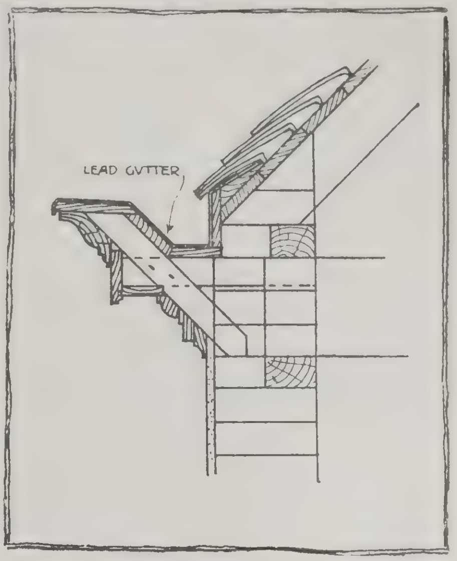
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of The Builders' Journal, 6, Great New Street London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of The Builders' Journal, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

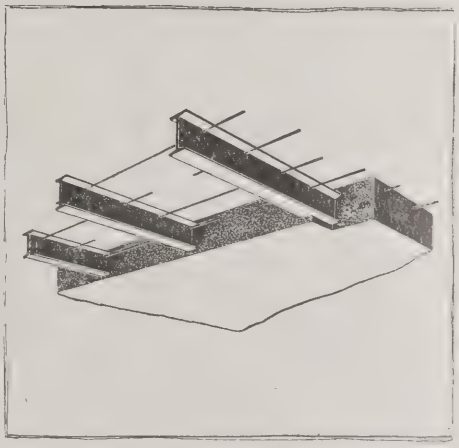
(*For Coupons see page vi.*)

Copies of "THE BUILDERS' JOURNAL" *containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

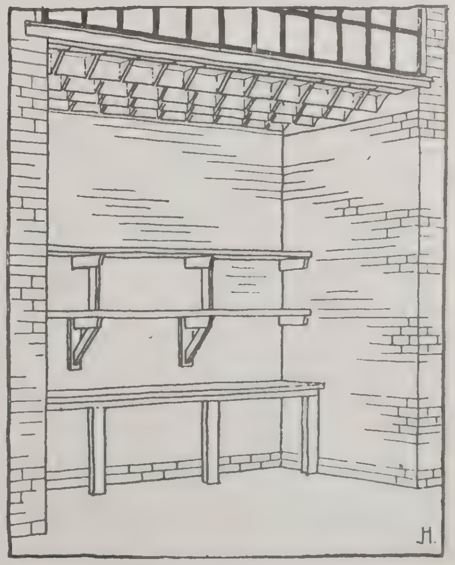
CLASS B (BUILDING).



B 28



B 29



B 30

Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

April 11. Elham.—*Removing earth and erecting a coal store* at the Workhouse, Lyminge. Plans and specifications can be seen at the office of R. Lonergan, clerk, 11, Cheriton Place, Folkestone, where tenders are to be delivered before 5 p.m. on April 11.

April 11. Portland.—*Erection of boiler-house* and chimney shaft and supplying and setting Lancashire boiler at the Steam Laundry, Portland. Plans, specifications, and conditions may be seen and form of tender obtained at the office of S. Jackson, M.S.A., architect and surveyor, Bridge Chambers, Weymouth. Sealed and endorsed tenders to be sent in on April 11, not later than 1 p.m., and addressed to E. Stevens, secretary of the Company, Bank Chambers, St. Thomas Street, Weymouth.

April 12. Melvaig.—*Erection of a new bridge* at Melvaig, Gairloch, for the Western District Committee Ross and Cromarty C.C., of the mason, steel and concrete works. Plan and specification can be seen by applying to J. Mackenzie, district road surveyor, Slattadale, Lochmaree, with whom offers, marked "Melvaig Bridge," are to be lodged on or before April 12.

April 12. St. Austell.—*Erection of bathroom, &c.*, to "Kent House," according to the plans and specifications which may be seen at Mrs. M. M. Kent's, Treogonissey, St. Austell, to whom sealed and endorsed tenders are to be sent not later than April 12. For further particulars apply to J. Mutton, architect, Charlestown.

April 13. Lancaster.—*Supply and delivery* in Lancaster of such quantities of English Portland cement as may be ordered up to Jan. 31, 1908, for the Streets Committee. Specification and form of tender may be obtained on application to J. C. Mount, A.M.Inst.C.E., borough surveyor, Town Hall, Lancaster. Sealed tenders, endorsed "Tender for Cement," to be delivered to T. C. Hughes, town clerk, on or before April 13.

April 13. Nelson.—*Erection of four business premises* on Commercial Street, Nelson, for Mr. T. Jones. Plans and specification can be seen, and full particulars obtained, at the architects' office, Station Road, Nelson. Sealed and endorsed tenders to be sent in to Jones & Howard, architects and surveyors, Nelson, Cardiff, on or before April 13.

April 15. Bishopstone.—*Rebuilding of the "Royal Oak,"* Bishopstone. Builders desirous of tendering must forward their names to P. B. Rigg, architect, Frome, on or before April 15, after which date bills of quantities will be sent and the plans and specifications can be examined at the offices of the architect.

April 15. Charleville.—*Alterations, additions, and improvements* to Ballyhubbo House, Charleville, for Nicholas FitzGerald, Fortlands, Charleville. Drawings and specifications can be seen on application to Mr. FitzGerald, or at the offices of B. E. F. Sheehy, architect, 57, George Street, Limerick, any day (Sunday excepted) between 10 a.m. and 4 p.m., Saturdays, 10 a.m. to 1 p.m. Sealed tenders, endorsed "Ballyhubbo House," must be delivered to the architect on or before April 15.

April 15. Aberaman.—*Erection of 80 houses* at Aberaman for the Aberaman Workmen's Cottage Building Club. Plans and specification can be seen at the office of T. Roderick, architect, Ashbrook House, Clifton Street, Aberdare. Endorsed tenders to be sent in to F. Preece, secretary, Aberaman Gardens, Aberaman, not later than 12 noon on April 15.

April 15. Cildderi.—*Erection of a house* at Cildderi, Golden Grove, for W. Griffiths. Plans and specification can be seen at the office of A. S. Williams, architect and surveyor, 7, King Street, Llandilo, to whom tenders, endorsed "House at Cildderi," are to be sent not later than April 15.

April 15. Margam.—*Erection of proposed lattice girder footbridge* at Tir Ynys, Port Talbot, for the Margam U.D.C. Plans and specification may be seen and forms of tender obtained by appointment with J. Cox, surveyor to the Council, Port Talbot, on payment of a deposit of £1 1s. Sealed tenders, endorsed "Tender for Footbridge," to be delivered to D. E. Jones, clerk to the Council, Port Talbot, on or before April 15.

April 16. Portsmouth.—*Constructing, completing, and maintaining* in thorough repair for six calendar months from the completion thereof a steam laundry and plant, together with a disinfecting installation complete, at the Infectious Diseases Hospital, Milton, in the borough of Portsmouth. On payment of the sum of £2 2s. a lithographed copy of the bill of quantities, with form of tender, can be obtained from A. Hellard, town clerk, Town Hall, Portsmouth, and the drawings and general conditions and specifications may be seen and full information obtained upon application at the Borough Engineer's offices at the Town Hall, Portsmouth. Tenders, marked "Tender for Steam Laundry and Plant at Milton Hospital," must be filled up, signed, and returned, with the bill of quantities duly filled in, to the Town Clerk, not later than 10 a.m. on April 16.

April 17. Chew Magna.—*Improvements to the Chew Magna Council School.* Plans and specification can be seen at the offices of W. F. Bird, Midsomer Norton, from whom further information can be obtained. Sealed tenders must reach the County Education Office, Weston-super-Mare, not later than 12 noon on April 17.

April 17. Colchester.—*Erection of a wooden footbridge* over the River Colne, in the Castle Park. Plans, specifications, quantities, etc., can be obtained at my office on payment of £1 1s. Sealed tenders, endorsed "Tender for Footbridge, Castle Park," to be delivered at the office of H. Goodyear, A.M.I.C.E., borough engineer and surveyor, Town Hall, not later than 9.30 a.m. on April 17.

April 17. Darenth.—*Erection of industrial workshops* at Darenth Asylum, near Dartford, Kent, in accordance with drawings and specification prepared by W. T. Hatch, M.Inst.C.E., M.I.Mech.E., engineer-in-chief. Drawings, specification, conditions of contract, bill of quantities, and form of tender may be inspected at the office of the Board, Embankment, London, E.C., and bill of quantities and form of tender can then be obtained upon payment of a deposit of £1. Tenders, addressed as noted on the form, must be delivered at the office of the Board not later than 10 a.m. on April 17.

April 17. Irlam.—*Erection of new Council offices.* Plans, specifications, and quantities may be seen at the Council Offices, Clarendon Terrace, Irlam. The Council require that a deposit of £2 2s. be made by intending contractors. Tenders, endorsed "Tender for New Council Offices," must be delivered at the Council Offices on or before 12 noon on April 17.

April 17. Liverpool.—*Proposed alterations and additions* to isolation ward, Belmont Classification House. The Guardians of the West Derby Union invite tenders for the above from contractors having places of business and workshops, and being bona-fide contractors carrying on business within the Unions of West Derby, Township of Toxteth Park, or the Parish of Liverpool. A set of quantities can be obtained from H. P. Cleaver, clerk to the Guardians, Brougham Terrace, West Derby Road, Liverpool, on payment of £1 1s. Specification and drawings can be seen at the office of C. H. Lancaster, architect, Brougham Terrace, West Derby Road. Sealed tenders, endorsed "Tender for Belmont Classification House," to be sent in to the Clerk to the Guardians, not later than 9 a.m. on April 17.

April 18. London, N.E. (Specification No. 29).—*Engine foundations and builders' work* at the Electricity Works, for the Metropolitan Borough of Hackney. The drawings may be inspected at the offices of R. Hammond, M.Inst.C.E., the consulting engineer to the Council, 64, Victoria Street, Westminster, S.W., and copies of the general conditions, specification, and quantities may be obtained in duplicate at the Town Clerk's Office, Town Hall, Mare Street, Hackney, on making a deposit of £5. Tenders (sealed and marked "Tender for Engine Foundations") must be delivered personally or by an authorised representative at the meeting of the Borough Council to be held at the Town Hall, Mare Street, Hackney, on April 18, at 7 p.m. Fair wages clause.

April 19. Portslade-by-Sea.—*Erection of a new police station* and police residences at Portslade-by-Sea. Persons desirous of tendering are requested to send their names and addresses to F. J. Wood, county surveyor, County Hall, Lewes, on or before April 19, from whom full particulars can be obtained.

April 20. St. David's.—*Erection of a new laboratory*, workshop, and cookery-room at the St. David's County Schools. Plans and specifications may be seen at the office of H. Thomas, architect and surveyor, 9, Victoria Place, Haverfordwest. Tenders, endorsed "Additions to County School," to be sent to W. D. Williams, Gwalia, St. David's, on or before April 20.

April 24. Edinburgh.—*Construction of various building works* as well as schemes and estimates for laundry engineering in connection with proposed public washhouses at Simon Square, for the St. Leonards district, according to plans and specifications which may be seen of R. Morham, city architect, Public Works Office, City Chambers, Edinburgh, and where also schedules of quantities may be obtained, on personal application only. The tenders must be sent to him in strict conformity with the official forms by 10 a.m. on April 24th, sealed and marked "Tender for Mason Work, Joiner Work," as the case may be.

April 29. Wootton Bassett.—*Erection of a private residence* near Wootton Bassett Station. Plans, specifications, and bills of quantities may be seen at the offices of Read & Osborne, architects, Regent Circus, Swindon, and High Street, Wootton Bassett, between 11 a.m. and 3 p.m. each day. Tenders to be sent in not later than April 29 to the above, sealed and endorsed.

May 1. Clonmel.—*Erection of two consumptive hospitals* at the Clonmel District Lunatic Asylum, where plans, specifications, and conditions of contract can be seen between 10 a.m. and 4 p.m. daily. Duplicates can also be seen at the offices of J. F. Fuller, architect, 179, Great Brunswick Street, Dublin. Bills of quantities can be had on payment of £2 2s. Tenders to be lodged with the Resident Medical Superintendent, Asylum, on or before May 1.

May 3. Walsoken.—*Enlargement and improvement* of the Walsoken (Norwich Road) School. Persons desirous of tendering should send in their names not later than 12 noon on April 12, to T. M. Kerridge, architect, Club Chambers, Old Market, Wisbech, from whom bills of quantities can be obtained on and after April 19, and at whose offices plans and specification can be inspected. A deposit of £1 1s. will be required. Tenders must be delivered by 12 noon on May 3, addressed to "The Secretary, Norfolk Education Committee, 57, London Street, Norwich," and endorsed "Tender for Walsoken School."

May 3. London.—*Admiralty extension, Block IV.* (superstructure). Drawings, specification, and a copy of the conditions and form of contract may be seen on application to Sir Aston Webb, R.A., 19, Queen Anne's Gate, S.W. Bills of quantities and forms of tender may be obtained at the undermentioned address on payment of £1 1s. Tenders must be delivered before 12 noon on May 3, addressed to the Secretary, H.M. Office of Works, &c., Storey's Gate, London, S.W., and endorsed "Tender for Admiralty Block IV."

No date. Newport.—*Erection of new business premises*, offices, &c., in High Street, Newport, for Davies & Sons. Plans, &c., may be seen and bills of quantities obtained of Habershon, Fawckner & Co., architects, 41, High Street, Newport (and Cardiff).

No date. Salisbury.—*Erection of boundary walls* and making gravelled walks at the extension of the Devizes Road Cemetery, Salisbury. Builders desirous of tendering can obtain all particulars and copy of the bills of quantities from G. F. Henbest, clerk to the Burial Board, 53, Canal, Salisbury.

No date. Leeds.—*Providing and fixing wrought-iron roofing*, steel stanchions, girders, and cast-iron gutters, required for new laundry in course of erection in Gelderd Road, Leeds, for the Leeds Industrial Co-operative Society, Ltd. Contractors wishing to tender are requested to communicate at once with the Secretary.

No date. Leeds.—*Enlargement of Salem Congregational Church*, Leeds. Contractors desirous of tendering are requested to send their names to Danby & Simpson, architects, 73, Albion Street, Leeds, when quantities and other particulars will be duly forwarded.

ENGINEERING.

April 11. Sunderland.—*Supply of the following stores* used in connection with the electric tramways:—Paint and oil, general electrical and car supplies, ironmongery, wrought-iron and steel, timber. Further particulars, with form of tender, may be had, and samples inspected on application to A. R. Dayson, general manager, Tramways Offices, Sunderland. Tenders, in sealed envelopes, endorsed "Tender for Tramway Stores," must be delivered at the office of F. M. Bowey, town clerk, Town Hall, Sunderland, not later than 12 noon on April 11.

April 15. Edinburgh.—*Construction of the west portion* of the Lochore to Redford line, about 2 miles in length, for the North British Railway Company. The drawings and specification can be seen at the office of Blyth & Westland, civil engineers, 135, George Street, Edinburgh, and copies of the specification and duplicate copies of the schedule of quantities and form of tender obtained from J. Cathles, secretary, 23, Waterloo Place, Edinburgh, on payment of £2 2s. Sealed tenders, marked on the outside "Tenders for Lochore to Redford Line, Contract No. 1," must be lodged with J. Cathles not later than noon on April 15.

April 23. London, N.—*(a) Diversion and culverting in* of the "Moselle Brook" from the north-west corner of Tottenham Cemetery to Lordship Lane; (b) widening Green Lanes on the east side from Harringay Bridge to Stoke Newington boundary, for the Tottenham U.D.C. Plans can be seen, and general conditions, specifications, bills of quantities, schedule of prices, and forms of tender can be obtained on application to W. H. Prescott, engineer to the Council, Council Buildings, The Green, Tottenham, any day during office hours. The sum of 10s. 6d. will be charged for the quantities for each of the works. Persons tendering will be required to deposit with the Treasurer when handing in their tenders the sum of £5 in Bank of England note or cash with the tender of each work. Fair wages clause. Sealed tenders, on the forms supplied, endorsed "Tender for——," as the case may be, to be delivered to E. Crowne, clerk to the Council, Tottenham, by 12 noon on April 23. Security will be required for the due performance of the contract.

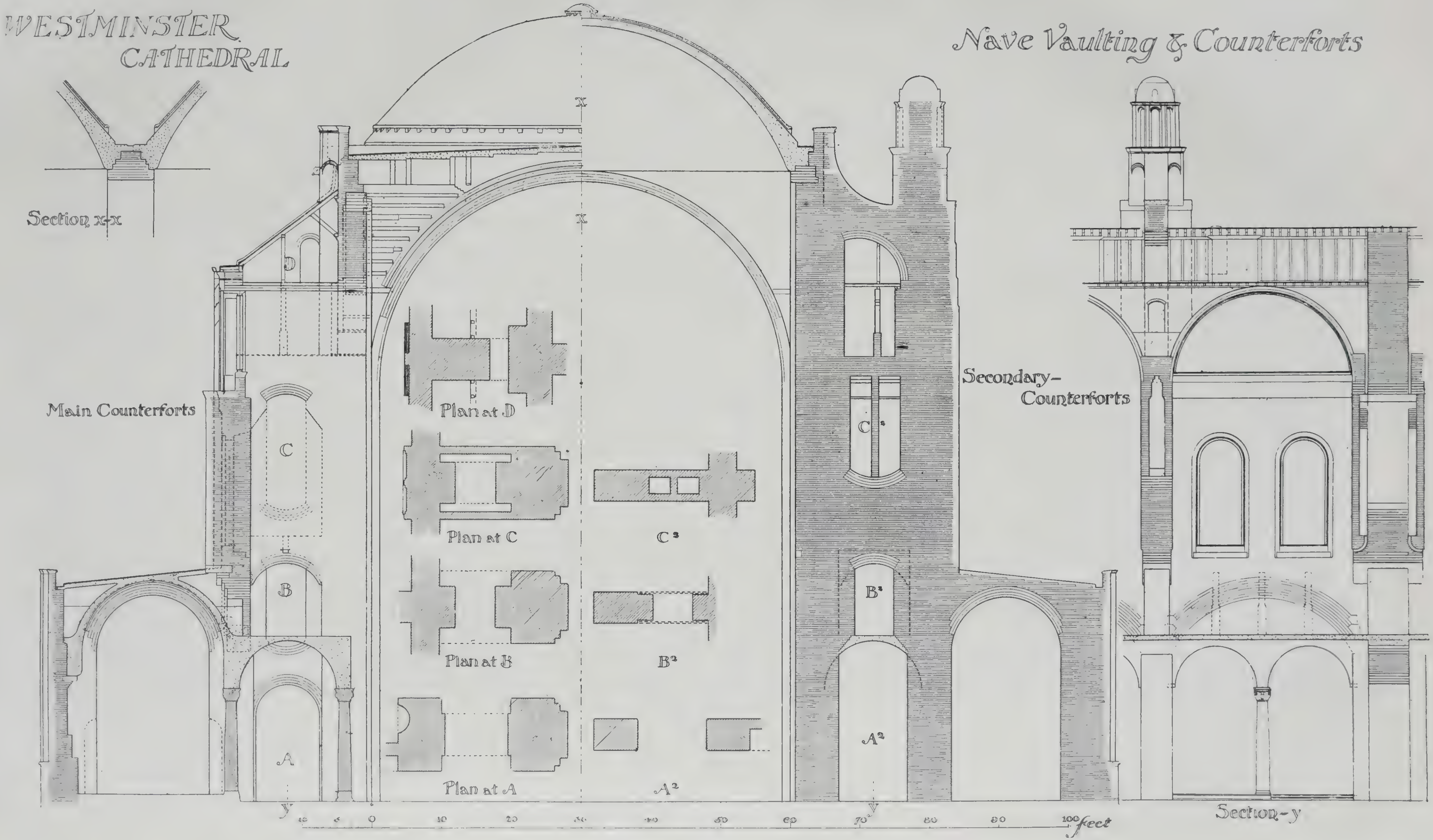
April 24. Handsworth.—*Supply, delivery and erection* of the following at their electric power station, for the U.D.C.:—Contract No. 18: Extension pipework. Tenders will only be considered for the whole of the work covered by the specification, and not for any part thereof. Copies of the specification, with the conditions of contract, &c., can be obtained on and after April 3, from H. Ward, clerk, The Council House, Handsworth, near Birmingham, on payment of a sum of £3 3s. The specification, conditions of contract and drawing can be seen at (but not obtained from) the offices of Kennedy & Jenkin, consulting

(*Contracts continued on page xxix.*)

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, April 17th, 1907.

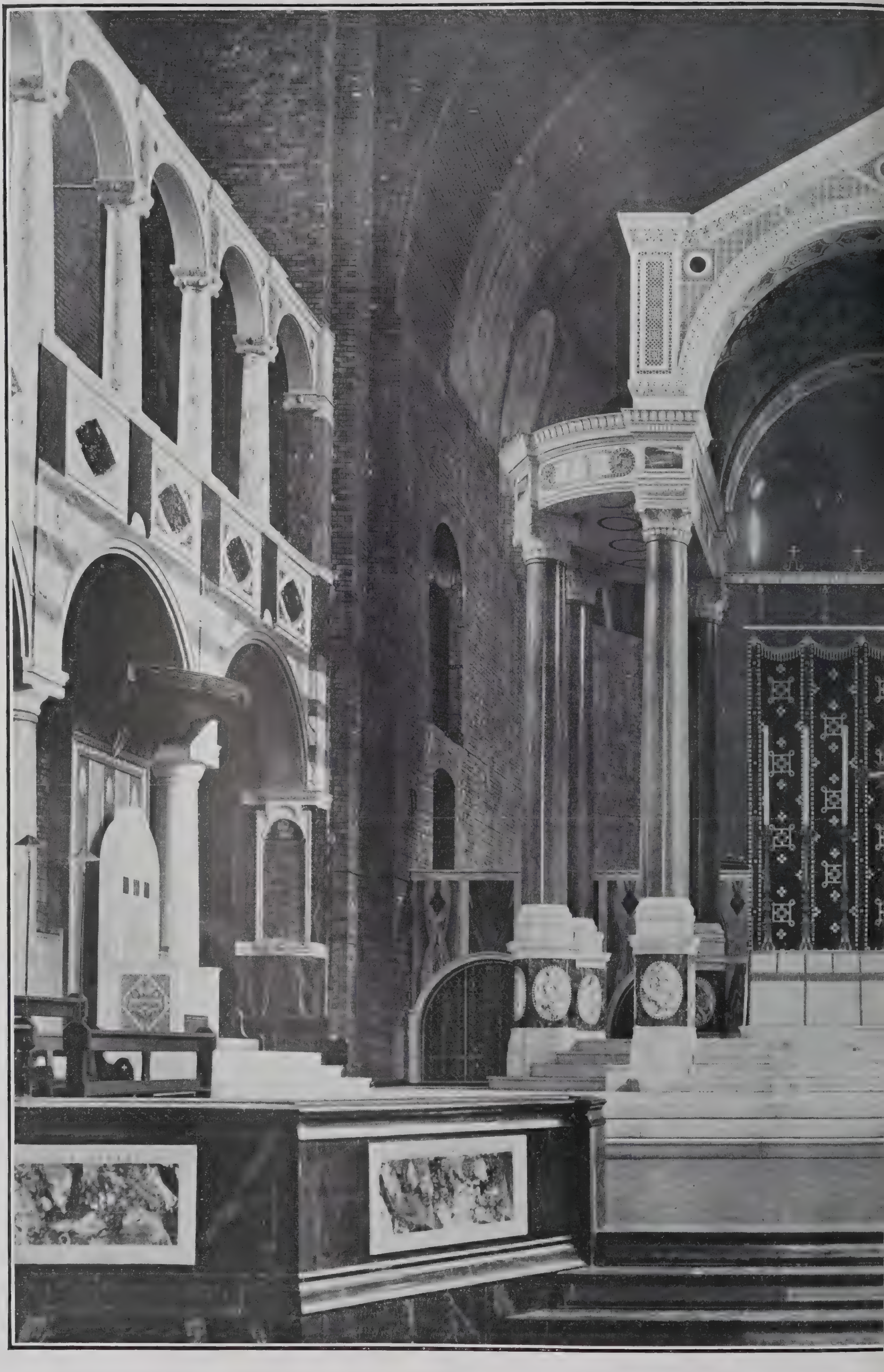
WESTMINSTER CATHEDRAL

Nave Vaulting & Counterforts

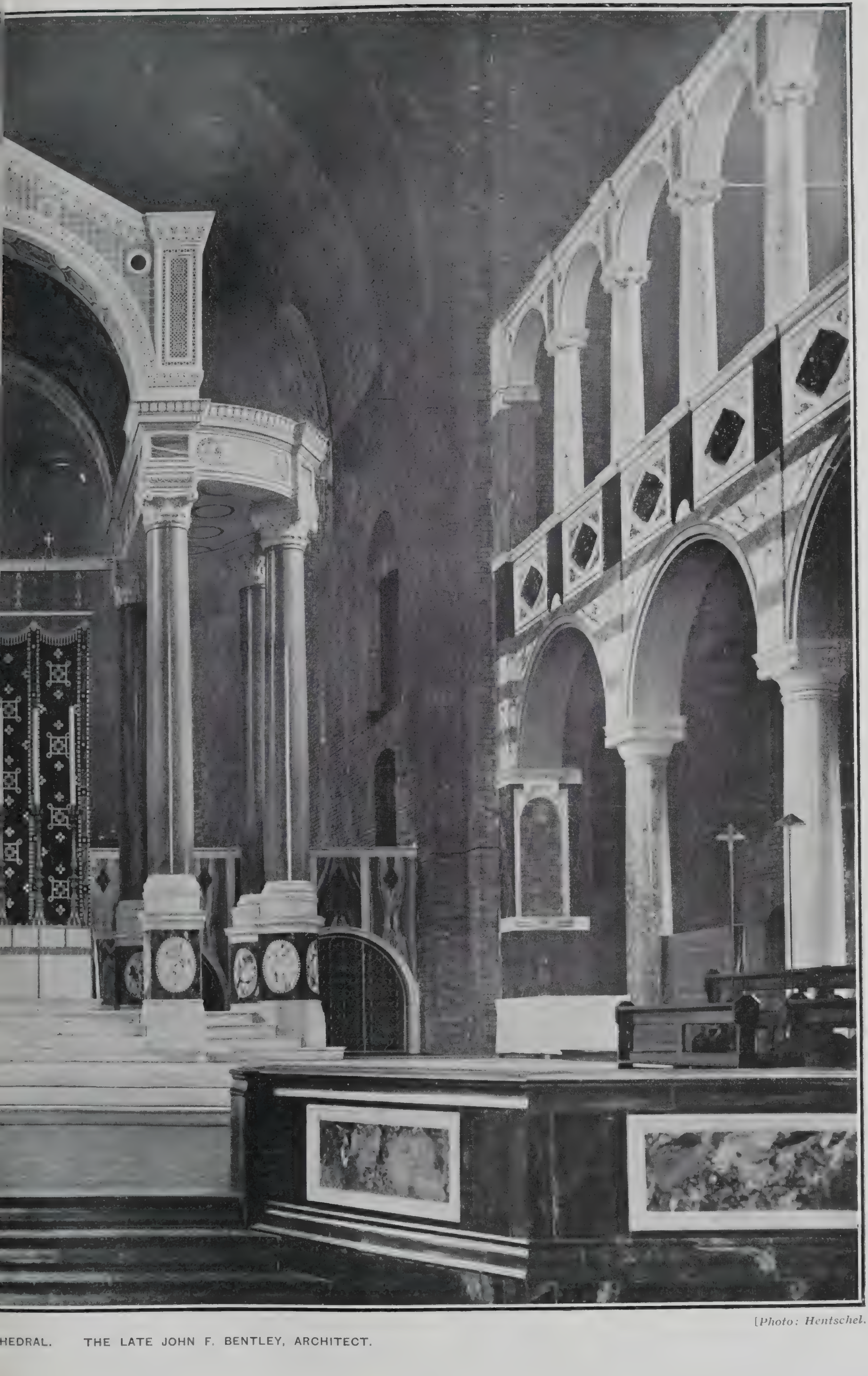


(Illustrating Mr. John A. Marshall's paper on "Westminster Cathedral.")

Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, April 17th, 1907.



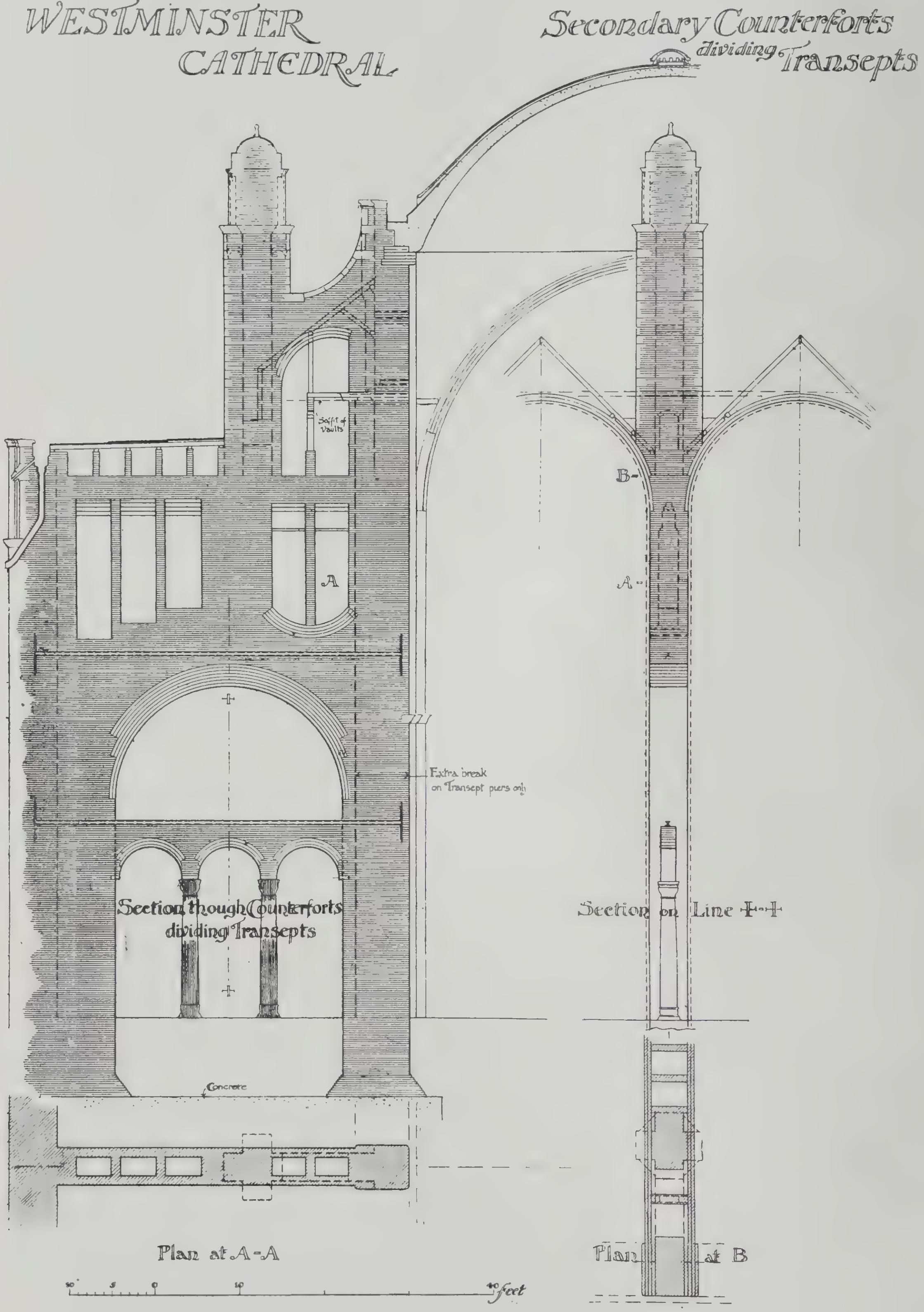
THE BALDACHINO AND HIGH ALTAR IN WESTMINSTE



[Photo: Hentschel.

HEDRAL. THE LATE JOHN F. BENTLEY, ARCHITECT.

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, April 17th, 1907.


WESTMINSTER CATHEDRAL
Secondary Counterforts dividing Transepts
Soffit of Vaults
A
B-
A-
Extra break on Transept piers only
Section though Counterforts dividing Transepts
Section on Line +-+
Concrete
Plan at A-A
Plan at B
10' 5 0 10 40 feet

(Illustrating Mr. John A. Marshall's paper on "Westminster Cathedral.")

April 17, 1907. Volume 25, No. 636.

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A Remarkable Paper. A great deal has been said and written about Westminster Cathedral, but we think quite the most remarkable contribution to the subject is that which we publish in this week's issue—namely, the paper by Mr. Marshall. This exhibits the rare combination of a deep knowledge of construction with a keen architectural sense. Moreover, it is written by the man who has been entrusted with the carrying-on of Bentley's great work. Mr. Marshall is not that type of architect who seeks publicity, but in well-informed circles he is known as a man of great ability, while many readers of this journal will remember his name in connection with the very able series of articles entitled "With Greek Builders" which appeared in our pages many years ago.

St. Paul's. It is to be regretted that the architectural profession should so often place itself in the unfortunate position that its opinions come to be regarded by the public as untrustworthy. In regard to St. Paul's, we thought that there would be no divided opinions among those experts consulted by the cathedral authorities. Unfortunately, the committee of architects disagree with the consulting engineers as to the danger likely to be done to the foundations of the cathedral by the construction of the proposed London County Council sewer. Sir John Wolfe Barry, it will be recollected, said some time ago that he did not think there was any danger to be feared by the construction of the sewer if certain precautions were taken, and Sir Benjamin Baker, who has been consulted by the Main Drainage Committee of the Council, is prepared to pledge his professional reputation that the sewer would not in any way affect the cathedral. He points out that whereas he has had 46 years' experience in tunnelling under London the four architects who have signed the report just issued have never built a sewer. Of course, this must be taken as a party statement; nevertheless, the committee of architects was ill-advised to go against the opinion of the cathedral authorities' own engineers. We have dealt with this matter on several occasions before, and we need not now repeat the opinions already expressed.

The new Regent Street Quadrant. The agitation which has been going on for some time with reference to the rebuilding of Regent Street Quadrant on Mr. Shaw's designs, worked up by the shopkeepers who have a false notion of the effect which the rebuilding will have upon their business, has during the past few weeks attracted much more attention than it did formerly. A lot of nonsense has been uttered. We were glad, however, to note that the agitation was given its quietus by Mr. Runciman, the Parliamentary Secretary to the Local Government Board, when he said a week or so ago that it was too late now to make any alterations in consideration of the views of lessees and others, even if any such could be shown to be desirable.

New, True, or Neither

The architect at the A.A. meeting last Friday who observed to his friend that the author of the paper on "Westminster Cathedral" had "marshalled his facts carefully" is doing as well as can be expected.

* * *

The Dean and Chapter of St. Paul's are asking how any public-spirited body can think of risking the safety of the cathedral; Sir Aston Webb, Mr. Belcher and Mr. Collcutt are wondering how their private reports have got into the public press; while the London County Council Engineering Department is perfectly amazed that anyone should prefer a musty old cathedral to an up-to-date sewer with all the latest improvements.

* * *

It is announced on unimpeachable authority that there is no truth in the rumour that Olympia is henceforth to be known as Montgomeryshire, nor that the Lord Mayor is re-carpeting the Mansion House. And there appears also to be considerable doubt as to whether or not the A. A. Musical Society and the "Purple Patch" have been invited to appear at the Royal Court Theatre, Berlin.

* * *

Those readers at the British Museum library who have been shut out for six months whilst the room is being cleaned and repaired and the works re-arranged, have been inveighing against H.M. First Commissioner of Works, but he appears to be very terse in his views on the subject. He simply said—Burnet.

* * *

I regret being unable to publish the following:—

"Mr. Norman Shaw's opinion of the Regent Street shopkeepers."
"The Regent Street shopkeepers' opinions of Mr. Norman Shaw."
"The Scottish pro-restorationists' thoughts on Professor W. R. Lethaby."
"Professor Lethaby's thoughts on restorers in general."

* * *

I see that one of the Regent Street shopkeepers pleads that if the new fronts are not altered his business will rapidly get into a very dicky condition.

* * *

The announcement is made that Borough Road Station, on the South-Eastern and Chatham Railway, is to be closed. The structure dates from Victorian days and would appear to be an early example of "armoured" construction in this country, as it is stated to be bound together and prevented from total collapse by the tin advertisement sheets which envelop it.

The Looker-On.

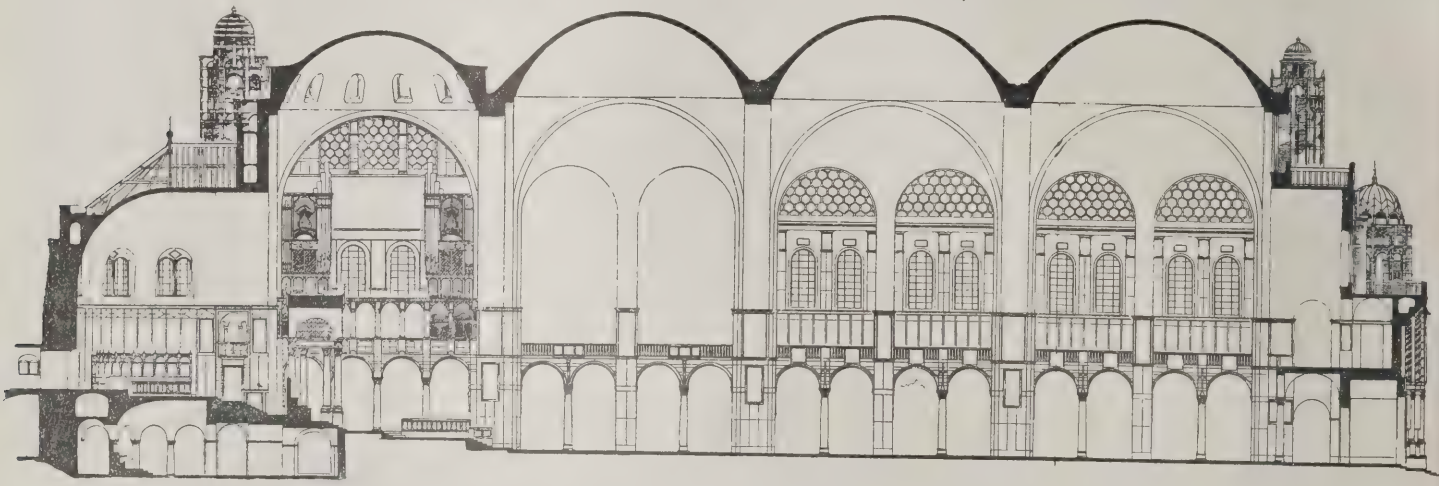
THE ARCHITECTURAL ASSOCIATION.

Mr. John A. Marshall on "Westminster Cathedral."

A meeting of the Architectural Association was held on Friday evening at Tufton Street, Westminster, the chair being occupied by Mr. Walter Cave, vice-president.

It was announced that the following had been elected members of the Association:—Messrs. P. J. Adams, P. M. Andrews, H. M. Archibald, F. E. Cannon, W. G. L. Cheriton, D. H. Fish, W. S. Grice, F. B. Last, H. T. Lubbock, A. H. Moberly, H. E. Moss, E. W. Mountford, H. R. Peerless, A. T. Phillips, R. Phillips, C. B. Reid, A. W. Robertson, A. L. N. Russell, R. Walker, H. Skyrme, D. Colville, T. Swales.

Votes of thanks were passed to Mr. Andrew Oliver for having arranged the Association's collection of seals, and to Mr. Maurice B. Adams for the collection of foreign architectural publications which he had presented to the Association.



Choir, St. Peter's Crypt. Baldachino and High Altar. Sanctuary. Transept. Nave. Narthex.

WESTMINSTER CATHEDRAL: LONGITUDINAL SECTION.

A paper on "Westminster Cathedral" was then read by Mr. John A. Marshall, who has been entrusted with the carrying on of the late Mr. Bentley's great work. Mr. Marshall's paper was essentially devoted to the scheme of the building and its constructional problems, his remarks being illustrated by some most interesting drawings, which we are able to reproduce in this issue. A wonderful model of the cathedral, made of wood, to ¼in. scale (by Messrs. Farmer and Brindley), and measuring 8ft. by 4ft., was exhibited in the room.

After some preliminary remarks in reference to the style in which the building was created, Mr. Marshall went on to explain

the development of the plan.

In this connection it is useful to refer to the three plans on the opposite page, which show the first, the intermediate, and the final schemes; the alterations made were either in accordance with the architect's own aims, or to meet the desires of the late Cardinal Vaughan.

Regarded as the tentative scheme of a great architect for so important a work, Mr. Marshall said the first sketch plan, made twelve years ago, was interesting, though it doubtless lacked the homogenity and the statical completeness of the final plan. If someone were curious to know why the first conception was abandoned, it would be necessary to explain that the more the architect considered the matter the less satisfied he felt with the transeptal arrangements and the "crossing"; the abutment for these parts, in the east, was insufficient, and the complications connected with the exterior were not encouraging; then it was decided that the eastern termination of the church should not be used as a sanctuary, but as a choir; it was also decided to limit the sacristies to one side of the building, and to rely on the aspiration of a single campanile, rather than on the conflicting efforts of two. In the revised plan the sanctuary and the choir have changed places, aisles have been introduced between the sanctuary and the eastern chapels, thus improving the abutment, but necessitating the abandonment of the aspidal terminations of the transepts, in order to provide suitable approaches to the eastern chapels. The transepts having now lost their peculiar form, we find the architect resorting, for internal effect, to another ideal, which, in the course of his practice had become so indelibly stamped on his artistic temperament that it invariably appeared in the churches designed by him—namely, the unbroken continuity of the nave arcades and vaulting across the transept openings, without entirely sacrificing the cruciform plan.

Support and Abutment.

Dealing with this portion of his subject, Mr. Marshall said:—You will have gathered that the dominating factor of the problem worked out by the architect has been a spacious and uninterrupted nave, covered with domical vaulting, and it will be obvious to you that the exceptional width of the space to be covered called for exceptional height, if due proportion of the interior was to be maintained.

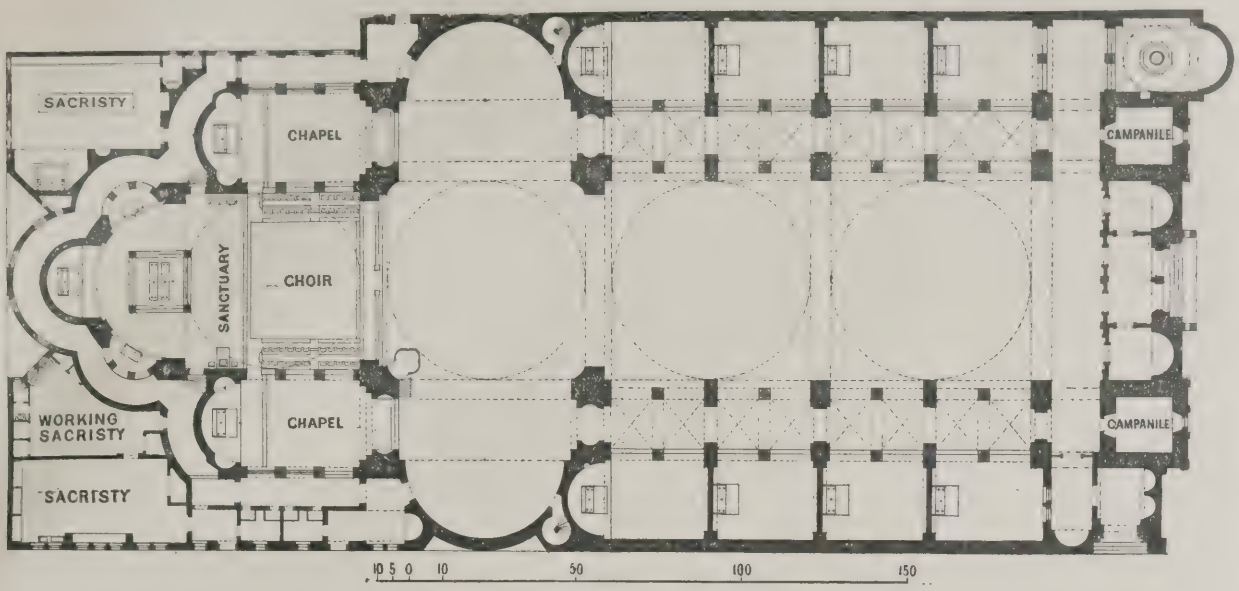
Thus, the difficulties of support and abutment were soon realised, and in selecting the pendentive dome of shallow concavity for the roofing the architect believed that the weight and the pressure would be reduced to a minimum. By showing the domes outside, not only was an extraneous roof dispensed with, but full advantage of the height was gained for the interior.

In the disposition of the piers and abutments, with a view not only to the sustentation of the pressure, but to reserving as much space as possible for the aisles, chapels and galleries, a system has been adopted not unlike that to be seen in most Gothic cathedrals, where huge, yet narrow, counterforts are projected at intervals, and stiffened by transverse walls, arcading and vaulting; but while, in a Gothic cathedral, these counterforts are generally most conspicuous features outside the building, at Westminster Cathedral they are practically limited to the interior, the spaces being entirely utilised. It may be noted, in passing, that in the latest instance of cathedral design in this country, both these methods have been rejected in favour of one in which all buttresses, as such, are avoided, by deeply recessing the alternate bays as transepts; and should this arrangement involve a sacrifice of that uninterrupted succession of parts which Mr. Bentley so much admired, it will be admitted that this is not the only quality that can be legitimately aimed at, and it is probable that the result at Liverpool may disclose quite opposite qualities, that will fully compensate for the loss referred to; at present we can only wish every success to the young architect who is now engaged on this important work.

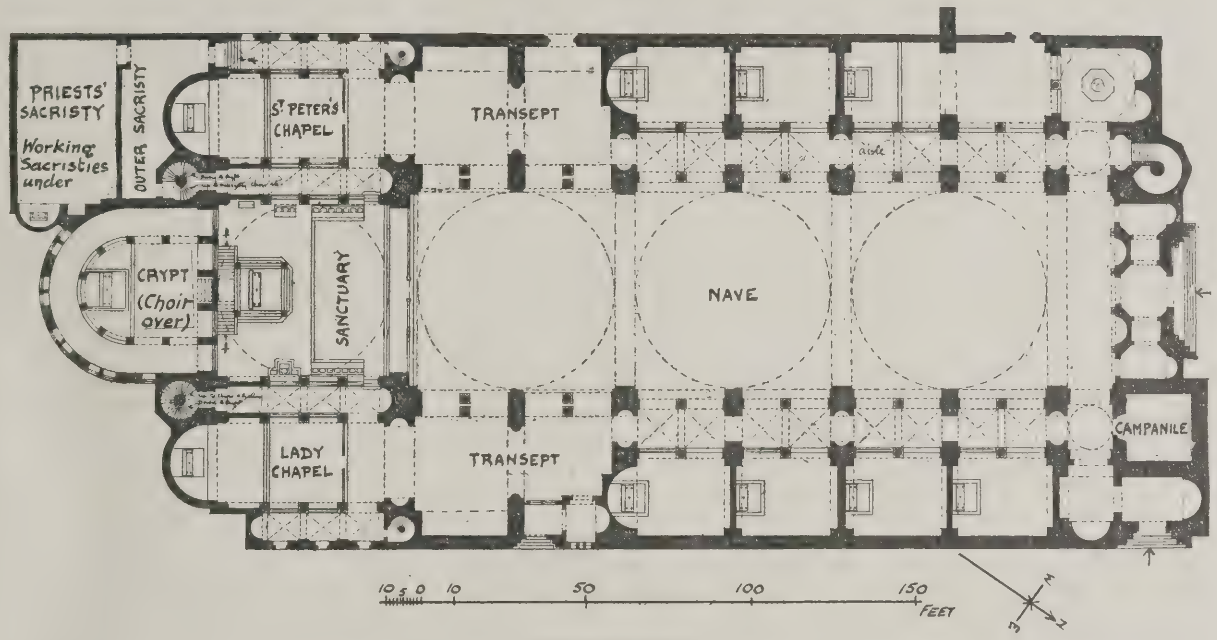
Confining our attention, for a time, to the nave of the cathedral, let us more carefully examine the counterforts and the vaulting they sustain. (See centre plate.) A reference to the plan will show that only in one instance is a main counterfort permitted to retain what may be termed its simple unaffected character, all the others being more or less influenced or modified by the exigencies of the plan; thus, two of them form the flank walls of the transepts, where, on the east, they are further strengthened by the walls and vaulting of the sanctuary, so as to resist the cumulative pressure of the nave vaulting. At the west end of the nave the corresponding abutment has been very considerably affected, not to say weakened, in the upper part, by the retiring disposition of the western facade—a concession to light and air claimants.

Of the secondary counterforts, those dividing the transepts have also a distinct and complicated character, while the others retain their simple form—excepting that next the campanile, but this, of course, affects only one side of the building.

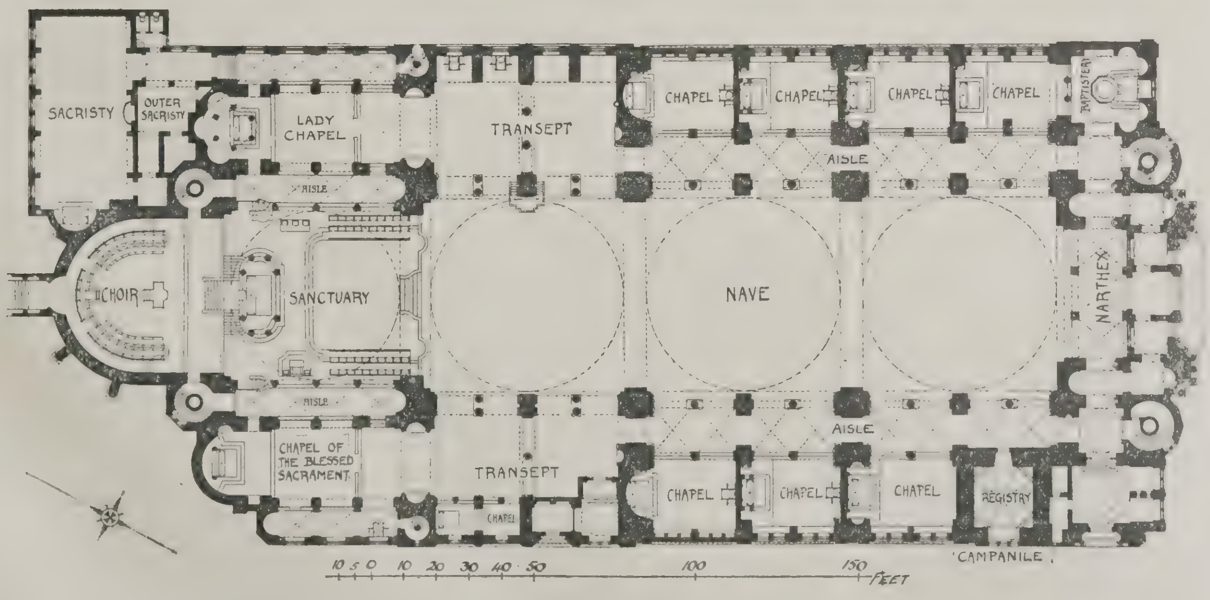
The proportions of each compartment of the nave are those of a cube, up to the springing of the main arches—60ft. from the floor. Another 30ft. 4ins., and we are at the springing of the domes; the total internal height being 111ft., or about 10ft. higher than the choir of Westminster Abbey.



The First Plan.

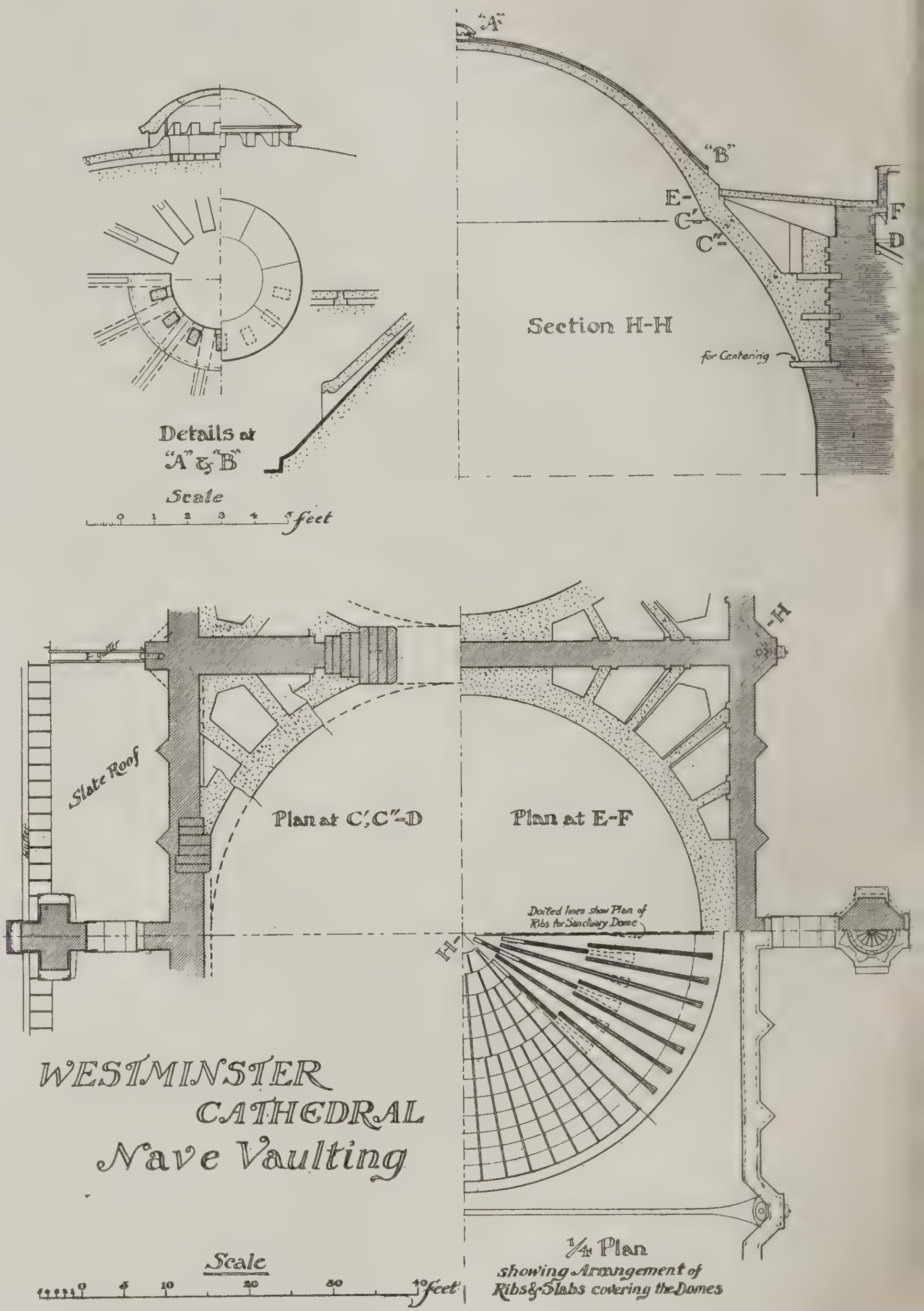


The Intermediate Plan.



The Final Plan.

THE DEVELOPMENT OF THE PLAN OF WESTMINSTER CATHEDRAL. JOHN F. BENTLEY, ARCHITECT.



WESTMINSTER CATHEDRAL Nave Vaulting

The extreme projection of the counterforts is 48ft., but just above the chapel vaulting this projection is suddenly reduced to 24ft., at which it is maintained to a height of nearly 90ft. The lower projections—forming the divisions between the chapels—are but little more than "flying buttresses," filled in with thin walls, so as to form recesses for the altars.

The enclosing walls, with the brick vaulting over the galleries and transepts, serve of course to stiffen the counterforts, and to increase the abutment; but the lower concrete vaulting of the aisles and chapels is not so important in this respect, and its construction was deferred until the main parts of the building were finished, and the full pressure of the superstructure had been realised.

And here the suggestion can scarcely be evaded—that this part of the design does not so exactly express the construction as do some of the other parts; for the massive walls of the triforium are not, as might be supposed, supported on the arcades that divide the chapels from the aisles, but on segmental relieving arches, turned over these arcades, between the counterforts, and concealed in the pockets of the vaulting. The span of each relieving arch is 25 ft., and the skewbacks are not cut into the piers, but are formed on granite springers that project beyond.

This expedient to reduce the span and maintain the piers intact was most essential next the transepts, where the triforium wall suddenly stops, and the abutment has been weakened by the formation of a passage in the wall of the transept. In view of this, and the complicated section of the relieving arches—due to the difficulty of clearing the vaulting of the chapels—you may perhaps wonder why so favourable an opportunity for the use of steel girders, that involve no thrust, and occupy but little space, should have been neglected; but the architect resolved not to introduce into the cathedral any ironwork as a support, though, as we shall see, he did not feel justified in objecting to its use as a tie.

The projections or buttresses between the lower windows of the triforium or gallery have an artistic value, though they serve no structural purpose. They are apparently supported on the flat roofing of the chapels, but they are really dependent on stone corbels that rest on the relieving arches, and blush unseen.

You will now see that the chapel arcades and vaulting are relieved of all extraneous weight, and it has been possible to make the arcades very slender, thus gaining extra space for the chapels, and imparting to these minor parts of the building a suitable relative proportion or scale. You will also now realise the importance of the galleries in disguising or masking the apparent weakness of the construction behind—just as a balcony is often projected along a façade as an antidote against the weak appearance of a ground floor storey.

The archways formed in the lower part of the counterforts, to preserve the continuity of the aisles, galleries, and passages, have been kept as small as possible, but in the upper parts hollow spaces have been left to economise material. These spaces were not enclosed until the brickwork had been exposed some time to dry, and small openings for ventilation were left in the upper and lower parts of the cavities to facilitate the drying after the enclosing walls were built. It was also desirable to keep these walls down until the cavities were arched or corbelled over (as the case might be) to prevent the accumulation of rubbish that would have blocked up the ventilators at the bottom.

The main counterforts are 10ft. 6ins. wide, and from these, at a height of 60ft. from the floor, spring the large transverse arches (6ft. 9ins. wide) that support the pendentives and the domes. As the thrust exerted by these arches and the pendentives is at a level much below the springing of the domes, it was not considered necessary to raise the main counterforts higher than the lean-to roof of the passage over the triforium vaulting; but the secondary counterforts, placed opposite the centres of the domes, are raised well above these roofs, and weighted with turrets, the supporting arches and wall at this level being comparatively thin.

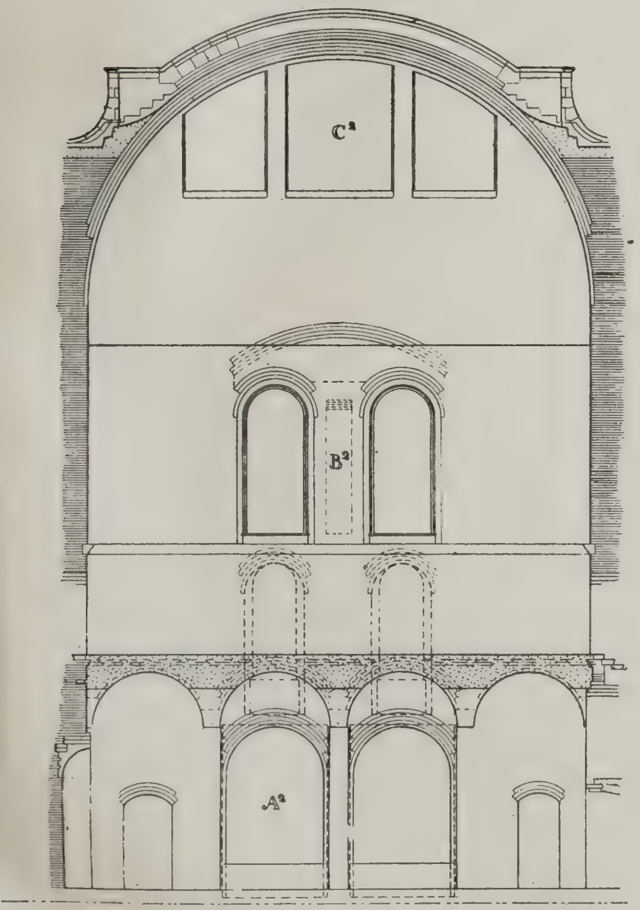
We have already referred to the exceptional character of the counterforts dividing the transepts. These, you will notice, consist on the ground plan of two piers, one next the nave, the other next the outer wall, the space between being arched over just above the level of the gangways or galleries that cross the transepts. To dispel the weak appearance of the pier next the nave, and to ensure a uniformity of scale on the ground floor, the openings between the piers are filled in with arcades that agree in height with those of the galleries; but these arcades do nothing towards counteracting the thrust of the arches over, and, indeed, they were not inserted until long after the main parts of the structure were built. In building the pier next the nave the precaution had been taken to make it 9ins. wider than the corresponding piers of the nave, but this was not considered sufficient, so a rolled steel tie was inserted just below the springing of the arches, where it would be eventually concealed by the arcades; and at a higher level—just above the crown of the arches—another similar tie was built in. When it is considered that the turrets of these transept counterforts are directly over the arches, and that the arches sustain nearly half the weight of the vaulting and the roofing, and that one of the domes is partly dependent on the pier, it will be admitted that these precautions are not altogether uncalled for.

At the west end of the nave the bewildering ramifications on the ground floor promise well for the abutment at the higher stages of the work; but, as we ascend, the gradual recession of the western facade soon dispels the illusion, until, on the top stage—where the pendentives exert most pressure—we find that counter resistance has been reduced to a minimum. Another effect, due to these legal restrictions, appears inside the building, where the perimeter of the western dome seems to be too near the large west window. A deep barrel vault over the window as originally intended by the architect would have afforded better resistance, and greatly improved the interior.

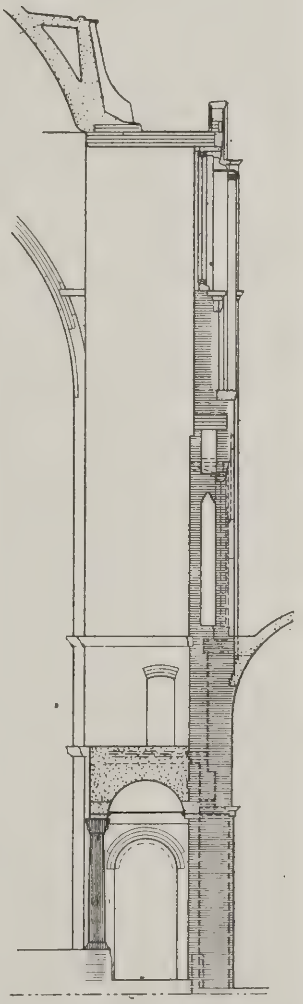
Having now considered the main features of the nave, regarding support and abutment, we will go back, in imagination, to that stage of the work when the main supporting arches had been turned, and the centering for these was still in position, there to remain until the final weight had been imposed.

On the north and south sides these main arches were not turned until the lower secondary arches and the brick filling were finished, so that the brickwork served as centering for that portion of the main arch that passes through the wall; but for the projecting portion, on which the pendentives rest, it was of course necessary to provide thin centering of wood. At the springing level of all the arches, and brick barrel vaulting, rough stone corbels were built in to support the centering, the projections being afterwards worked off.

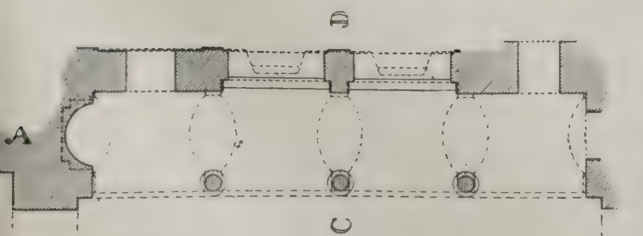
Walls of Sanctuary



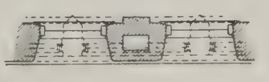
Section A-B



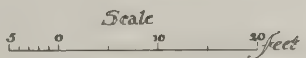
Section C-D



Plan at A²



Plan at B²
Dotted lines show Plan at C²



The spandrels of the main arches are filled in up to the crown level with brickwork, set back 13½ins. from the faces of the arch to reserve a seating for the concerete of the pendentives. The visible junction of the brick arch and the concrete forms merely an angle or line, and if we follow these lines down to the springing where the supporting arches separate, we shall find them meet, so that the surface of the pendentive expands or develops from a mere point, but this apparent weakness in the construction is obviated by the very common method of building the lower portion of the arches and the pendentives of brick in horizontal courses; thus, a continuous joint is avoided by cutting the brickwork to the required angle, and the top of the brick corbelling forms a seating of considerable area for the solid concrete backing.

The lower portion of the pendentive, just described, rises to a height of 13ft. above the springing; fixed centering for this part was not necessary—the accuracy of the demispherical curves being ensured by the application of movable templets. But, for the upper part of the pendentive, closely boarded centering was necessary, and to support this at the bottom a projecting stone landing was built in, on the top of the brick corbelling, the projection being afterwards worked off. To secure bond for the concrete backing of this upper part, and to distribute the bearing, 6-in. stone landings were built in at intervals in the height across the angles formed by the enclosing spandrel walls.

Projecting courses of brick are also formed on these walls to serve as a key for the concrete. To limit the weight, the top part of the pendentive has no solid backing; it is, in fact, built as part of a dome, having a shell 2ft. 6ins. thick, but on this shell radiating counterforts or ribs are formed that incline up to the base of the dome, and on these counterforts there are light sleeper walls that support the flat roofing around.

To ventilate the cavities 4½-in. drainpipes were inserted in the shell and counterforts, communicating with the interior of the building. Constructionally, the pendentives may be regarded as corbels, by which the weight of the domes is not merely sustained, but directed to the piers.

Nave Domes.

The circle developed by the pendentives is 60ft. in diameter; the base of the dome is corbelled over from this, so that the springing is clearly defined, and a salient angle at the junction of the two surfaces is thus avoided, for the convenience of the mosaic workers of a future generation.

The thickness of the domes at the springing is 3ft., gradually reduced to 13ins. at the crown; the curve of equilibrium is therefore well within the material.

The domes were turned on closely boarded centering, in a series of superimposed rings of concrete averaging 4ft. in width. The concrete was not reinforced in any way. The centering consisted of radiating trusses supported from the ground, on uprights 90ft. in height, made of stout planking, bolted together, so as to break joint, and cross-braced at intervals. It was important, of course, to have the centering perfectly rigid, to preserve the true curvature of the concrete until it had finally set. Full responsibility for the centering rested with the builder who had contracted to carry out the work, and if his method lacked the daring and skill of a Brunelleschi or a Fontana, he certainly incurred no risk, and did not stint the timbering. The eastern dome of the nave was turned first, then the dome of the sanctuary, next the middle dome of the nave, and lastly the western dome. Their construction occupied about fourteen months.

The independent external covering of the domes is formed of 3-in. artificial stone slabs, cast to the curve. They rest on radiating ribs 5ins. deep of similar material, fixed on the concrete, and rebated to receive the slabs, thus leaving an air-space of 2ins. between the inner shell and the outer covering, the object being to render the temperature of the interior more uniform. At the springing and at the crown the spaces between the ribs are left open for ventilation, and to prevent the wet being driven into the cavities at the top a circular raised curb is formed on the top edge of the upper slabs, over which is placed a domical capping that allows the air to circulate freely.

To form the outer covering more than 600 slabs were required for each dome; the exposed surface is therefore an elaborate network of jointing, and we cannot but feel that an outer coating of homogeneous asphalt would have been more impervious. You will note that by rebating the ribs for the slabs each radiating section of the covering is kept is position independently of the rest.

The concrete flat roofing around the domes is covered with asphalt that passes up the lower portion of the dome to a height of about 4ft. 6ins., under the outer covering, where it is keyed into the concrete.

The Sanctuary, etc.

The eastern portion of the cathedral, comprising the sanctuary, the lateral chapels, and the choir, presents a system of construction essentially Byzantine, the luminous corona of the sanctuary dome being raised aloft on vaulting that seems to be independent of direct support. This buoyancy is due to the extensions that open out on all sides, equal in span to the dome itself. The enclosing walls of the sanctuary, on the north and south, have very materially affected the design of the eastern chapels. Originally, these chapels were to have been enclosed by slender arcades, on marble columns, corresponding with those of the organ galleries adjoining; but—as in the case of the chapels of the nave—it was soon found that these arcades would not be sufficient to sustain the weight of the walls over, which are the highest in the building; so the columns were changed into brick piers, and the two end bays of the arcades were filled in, leaving only two bays open in the middle, and a couple of narrow doorways at each end, for access to the aisles. Over the filled-in bays are built the solid portions of the outer wall, against which the organs will probably be placed, while over the two open bays is built the lighter portion of the wall containing the windows.

The weight of this central part does not, however, entirely depend on the arcade below, for above the two lower windows a relieving arch is turned that transmits the weight of the upper part of the wall to the solid portions at the sides, and to still further reduce the weight that portion of the brickwork under the relieving arch and between the windows is built hollow.

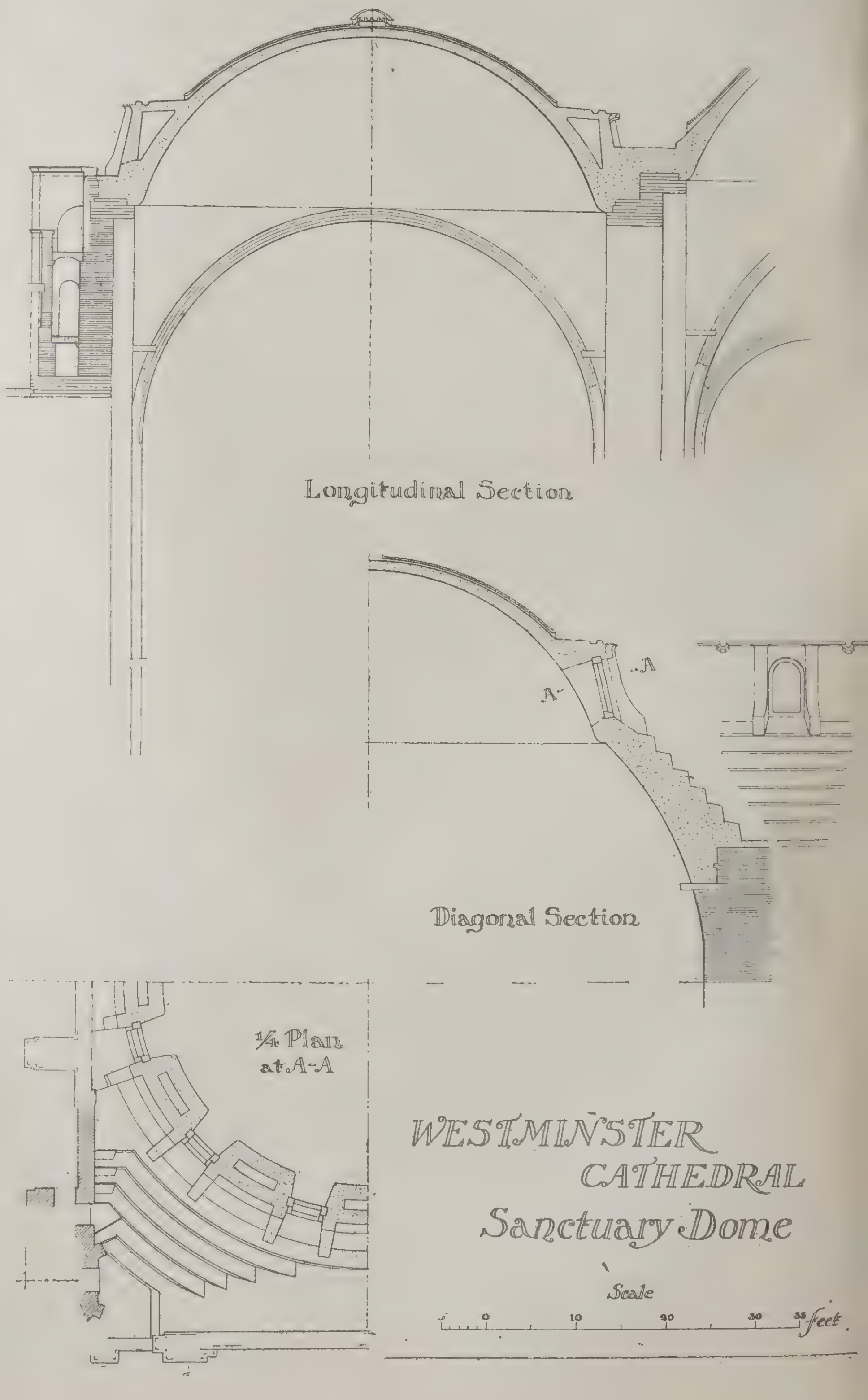
The Galleries.

The organ galleries are independent factors of the construction, and, like the galleries of the nave, were left down until the main parts were built. The concrete vaulting of these galleries, and the western gallery of the nave, is not let into the walls at the back, but supported on brick and stone corbelling, so that the walls are not weakened; the concrete was, however, keyed to the wall by projecting courses of brick, and, as an extra precaution, the columns supporting the vaulting of the organ galleries are tied to the brick wall by gunmetal ties, while for the west gallery of the nave ties were inserted at the floor level of the gallery, where the wall of the narthex has most resistance.

You now see that in no part of the cathedral does the main structure depend on marble columns.

The Sanctuary Dome.

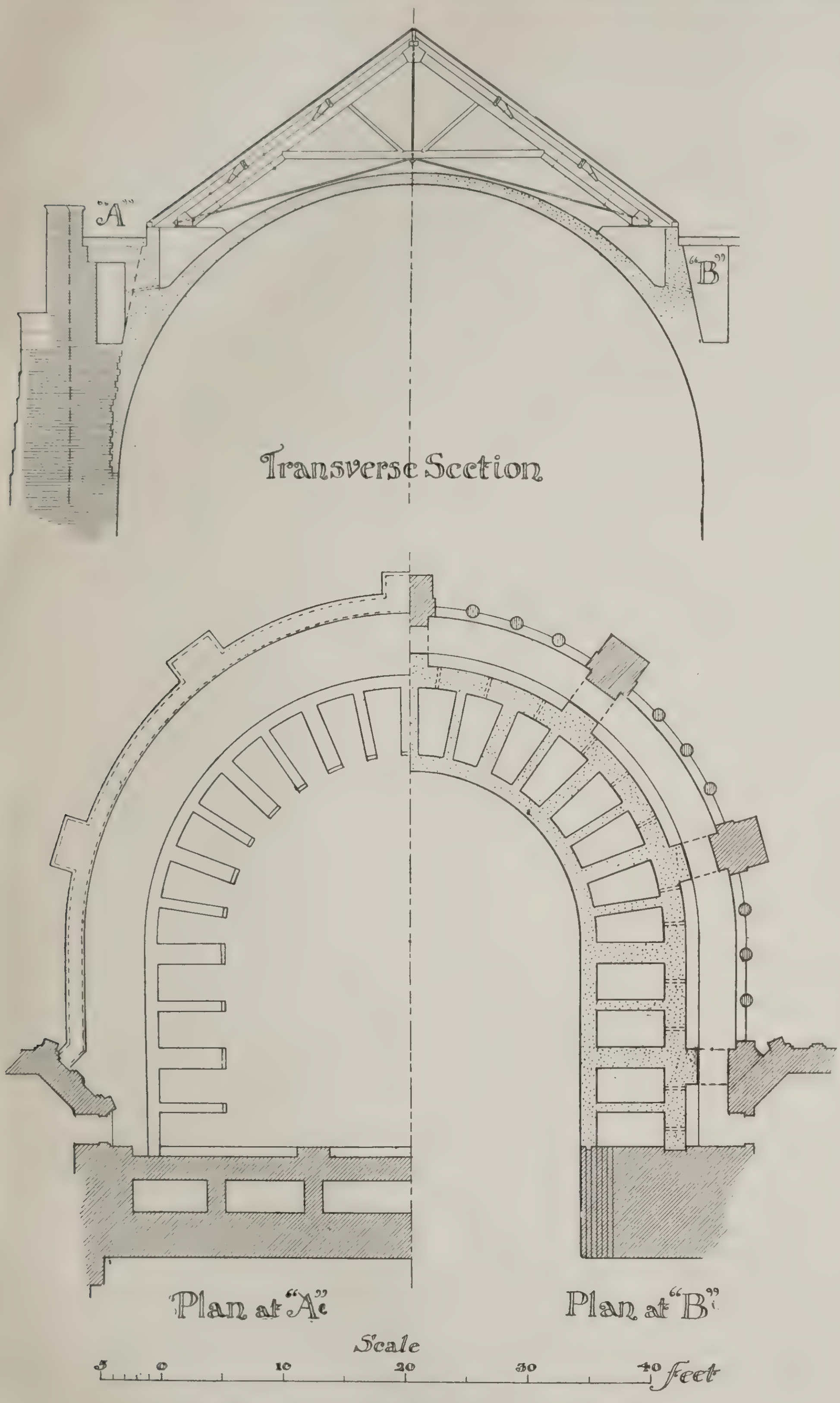
We are now in a position to examine the eastern dome, which differs in several respects from those of the nave. Unlike the latter, that seem to rest on the flat roofing of the church, the dome of the sanctuary emerges gradually out of the substructure—the extrados of the pendentives forming a pyramidal series of offsets or steps that follow the plan of the dome. The reason for thus exposing the pendentives outside was to limit the height of the supporting walls on the north and south, so as to give greater elegance to the eastern turrets, and to bring this part of the building into closer harmony with the choir. To further this object, the vaults over the organ galleries are also


Longitudinal Section

Diagonal Section

¼ Plan at A-A

WESTMINSTER CATHEDRAL
Sanctuary Dome



WESTMINSTER CATHEDRAL: VAULTING OF CHOIR.

exposed, the whole group presenting a subtle gradation of parts, more Oriental than the rest of the building, and perhaps more expressive of the internal arrangements.

The abutment for the main supporting arches of the sanctuary dome is provided by the staircase turrets on the east, and by the transept piers on the west; while for the dome itself abutment is provided on the north and south by the vaults over the organ galleries, on the west by the dome of the nave, and on the east by buttresses built on the wide supporting arch that forms part of the vaulting to the choir; these buttresses being stiffened by the outer wall of a passage-way that passes through them, to provide communication between the staircase turrets.

The circle developed by the pendentives is 52ft. in diameter. On the closely boarded centering for this dome other centering had to be constructed for the window openings, the reveals of which represent a series of counterforts all round the dome. Centering had also to be constructed for the wall of the drum or circular podium, designed to disguise the counterforts, and to protect the glazing from the drainage of the dome.

The Crypt and Choir,

It would be convenient now to inspect the upper part of the choir, but we had better perhaps descend by one of the eastern turrets and begin at the bottom—on the very foundations of the church, in fact. The floor of the choir is some 13ft. above that of the nave, so it was almost impossible to avoid the formation of a crypt, only a very slight excavation being necessary to get the required height. The depth of this excavation was, however, limited to a level below which it was impossible to go by an existing platform of concrete, about 9ft. thick, that extends over more than half the site, and served as the foundation for an earlier building.

As the top surface of this platform is practically the floor of the crypt, the architect was anxious to dispense with footings around the apse inside—a slight departure from the Building Act that was graciously permitted; but on the outside footings were provided, though they were not a structural necessity. At that time these footings were covered by the ground that rose above the floor of the crypt, but a subsequent alteration of the levels led to their exposure, and they are now again concealed by a retaining wall that forms a low circular podium between the buttresses.

The eastern termination of the cathedral suggests the Romanesque or Lombardic style—if you will—of Northern Italy; the crypt opening into the church, with the retro-choir above, closely following St Ambrogio's, Milan; the open colonnade under the eaves, and the timber roof over the vaulting, are all familiar features; but the huge buttresses give distinction, and resist the pressure of a vault having a span of 48ft. Up to nearly half its height, this vault is a solid mass of brickwork, roughly corbelled over to the curve, and faced with concrete. Above this level the vault is a concrete shell 18ins. thick at the bottom and 12ins. at the crown.

A retaining wall of concrete is built on the haunches to receive the counterforts or sleeper walls, on which are placed the principal trusses of the roof. The buttresses of the apse rise to the height of the retaining wall, and the two are connected by massive concrete lintels, formed across the gallery, behind the buttresses. The gallery is covered with concrete slabs, cast *in situ*, that form a flat around the timber roof. To prevent the arcades of the gallery being pushed out by the expansion of the concrete ;the flat and the lintels were kept clear of the brickwork until the concrete had thoroughly set; the joints were then made good.

But we must not linger over these details, neither have we time to ascend the campanile; we wish, however, before closing this section of our subject to draw attention to

two singularities in the construction

that call for some explanation. Firstly: Why should the vaulting in some cases be entirely of concrete, and in others entirely of brick? Secondly: Why should some of the vaulting be protected by extraneous roofs, while in other places its surface is fully exposed to the weather?

Obviously, where the shell of the vaulting is of a graduated thickness, and curved on plan, concrete is the strongest and most adaptable material to use; the complications of groin vaulting are also most readily cast in this material. So we find, for the pendentives and the domes, for the vaulting of the choir and chapels, for the more complicated vaulting of the crypt, aisles, baptistery and porches, concrete has been used; but for the vaulting of the transepts, and the corresponding vaulting of the triforia, brick is the material employed, in order that the deep soffits of the brick-supporting arches in front may appear as part of the vaulting behind, and the line of junction between the two should not show ; thus ensuring a uniformity of surface texture.

Respecting the contrariety of the roofing, it will be as evident to you, as it was to the architect, that a timber roof over the nave and sanctuary, even of a low pitch, would have been uncouth and harsh; such a roof would also have been commonplace; whereas these parts of the building have now a distinction, not unpleasing, and most interesting. Rising, as they do, from the mighty and unbroken podium afforded by the lateral chapels, they appear disdainful of protection, and defy the elements.

But there is a law of contrast, as well as of analogy; the limitations of this law are, however, easily exceeded, and a watchful eye is necessary to prevent the intrusion of discordant elements. At Westminster Cathedral the most striking instances of its application are afforded by the campanile, and by the roofs and turrets of the transepts and the choir. Structurally, it would have been quite possible, and more consistent, to have exposed the vaulting outside, throughout the building; and we can imagine what the effect would be. But the Greeks did not always expose their statues to the cold; they appreciated quite as much as we do the charm of the rippling garment; even Aphrodite was allowed the luxury of a pair of sandals. And so at Westminster Cathedral the rounded surfaces of the vaulting are not everywhere exposed, but discreetly concealed in places by extraneous roofs, suggestive in a measure of the forms beneath. A piquancy and an interest are thus imparted to the design. We may theorise about discordant elements, but we are forced to acknowledge the refining influence of the artist's skill.

The Interior Decorations.

Having now dwelt on some of the most salient features of the construction, some reference will be expected to the internal decoration, intended by the architect to form an essential part of his conception, but which, unfortunately, he did not live to see carried out, and scarcely commenced. When Mr. Bentley received instructions to design the cathedral he had scarcely been out of this country, certainly not to "the land where the citron blooms." He then felt it his duty to see for himself those incrustations of marble and mosaic so charmingly described by Paul the Silentiary and John Ruskin. He did not, however, cross the Adriatic nor visit Sicily. He had realised his powers, and was therefore in a position to discriminate. He took with him a small note-book, but, excepting four plans of churches, it came back empty. He had neither time nor inclination for mechanical toil that would have dispelled the charm, as it did, eventually, for Ruskin in Venice. The Italian tour did not determine the style of the cathedral, though it confirmed it.

The first sketch plan made after the architect's return suggests in parts Sta. Sophia, Constantinople, though Mr. Bentley never saw that building; the final plan shows the influence of St. Mark's, tempered by an ideal he had made his own.

Mr. Bentley's suggestions for the revetment of the interior show, as might be expected, an appreciation of the principles underlying the application of marble and mosaic as exemplified at Venice and at Ravenna. The well-defined line of demarcation between the two materials, at a uniform level; the high and narrow slabs, riveted to the walls and piers, and "opened out" so that they could not possibly be mistaken for solid masonry; the strips or facets that roughly follow the curves; the extreme thinness of the veneer, exposed at all salient angles; and, above all, the vast expanses of sheeting, due to the unbroken wall surfaces, and the massiveness of the piers, undisturbed by mouldings, and made more impressive by the insertion, at rare intervals, of choicer slabs, and by the brilliancy of carving—these are some of the qualities we associate with the ideal type of marble revetment.

This being so, it is evident that the essential features of Mr. Bentley's plan scarcely afford scope for a full development of this type. The sub-division or multiplication of the piers, and the lack of unbroken wall surface on the ground floor, demanded a treatment on independent lines, that may perhaps be best described as a compromise between the Byzantine and the Renaissance.

Another marked divergence from the Byzantine type—in an opposite direction—is seen in the sparing use of columns for the gallery arcades, resulting in a wide inter-columniation, again in favour of the Renaissance.

But if the piers and walls do not present an ideal field for the application of marble, this cannot be said of the floor space, where unbounded facilities are afforded for that most essential feature, from the architectural point of view, a marble pavement throughout the building.

The value of the marble paving in relation to the wall lining can be seen in the Chapel of the Blessed Sacrament, and in the two western chapels of the nave. In the nave itself a commencement of Mr. Bentley's scheme for the paving has been made by laying the narthex and the strips or borders between the piers and columns, so that these latter are spared the indignity of rising from a platform of wood-block flooring. The marble paving of the sanctuary, around the baldachino, has just saved this immense canopy from a similar insult, though it can never compensate for defects due to the lack of Mr. Bentley's personal supervision. The same may be said of the organ gallery screens, adjoining. Unfortunately, while the painter can rectify a weakness or a false note of colour by a stroke of the brush, the designer in marble is committed for ever to the first touch. His only safeguard is to remember that the doctrine of harmony and restraint applies to all the arts, and if an extensive palette is a snare to the painter, it is a still greater entanglement to the designer in marble, whose best effects are produced by a limited range of colours.

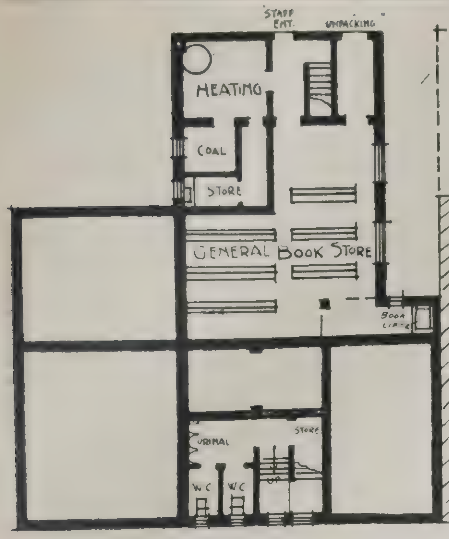
I will not weary you by attempting a description of the marbles used at the cathedral, but I may be permitted to remind you that in the two western chapels of the nave Mr. Bentley initiated the principle of framing the variegated revetment with white marble only; thus there is not that confusion of colour or workmanship, nor that rampant effect of the strings, cornices and architraves that one so often sees when the reverse method is adopted; in a word, the effect is refined rather than bizarre.

The respective merits of these two chapels cannot be considered apart from the mosaics, and if the Chapel of the Holy Souls is the most concordant, this is because its mosaic decoration most nearly approaches Mr. Bentley's ideal.

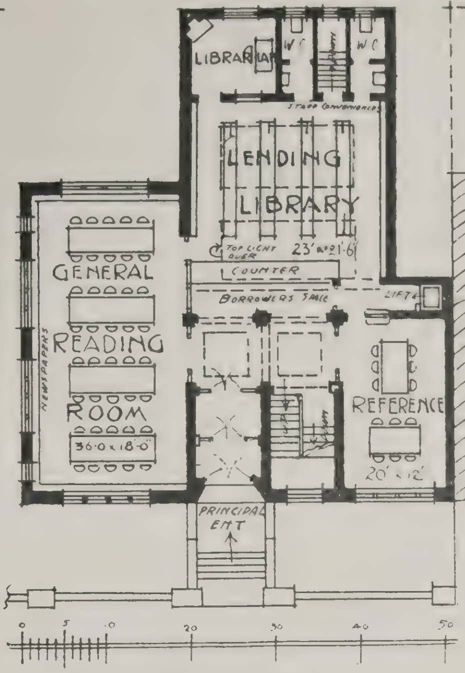
The guiding influence of the architect is here strikingly apparent throughout, and Mr. Symons, who made the cartoons for the mosaics from his own sketches, has admirably followed the architect's suggestions, without that self-effacement that would have destroyed vitality. While not opposed to tradition, the work is as unfettered in style as the cathedral itself. If the general effect is satisfactory, the barbarity of the technique may be condoned.

These subsidiary parts of the cathedral **may be regarded** as experimental, in view of the vast area awaiting decoration in **the nave.** For this Mr. Bentley left no suggestions—excepting details for the marble work. Some men get ideas very quickly, flashes of inspiration—a kind of radio-activity—and the thing is done. Without a moment's hesitation they rush in where angels fear to tread. No wonder their works look raw and unfinished, and will not stand the test of time. With others the idea grows or develops, they feel their way gradually, one thing leads to another, and ultimately to a solution of the problem. The result has entailed much labour, though it may seem to have been attained without effort—the work endures. This was Mr. Bentley's way.

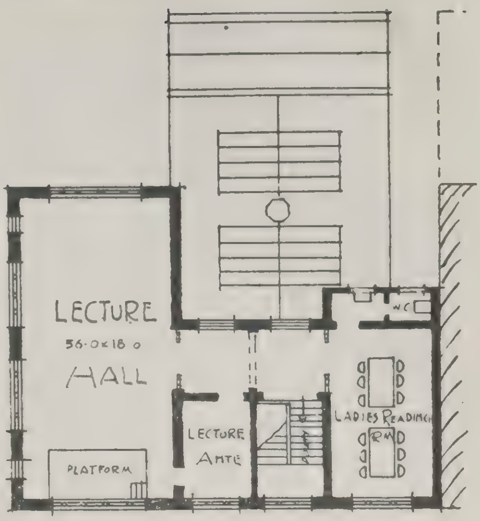
A vote of thanks to Mr. Marshall for his paper was proposed by Mr. H. H. Statham, who remarked that in Westminster Cathedral they had got back to real building on a grand scale, back to the essential qualities of medieval building. Mr. J. E. Newberry seconded the vote, which was supported by Mr. Arthur Keen, the Bishop of Arindela, Mr. Baines (of Messrs. Farmer & Brindley), and the chairman. Mr. Arthur Keen said that Westminster Cathedral had always struck him as a complete reply to the argument that a great building could only be produced in the medieval way: in this case everything, down to the smallest detail, had been entirely done in the office on paper. The only building in this country which seemed to be comparable in its effect was St. Bartholomew's, Brighton (by Mr. Scott), which was vast beyond conception, and depended very much for its effect upon the qualities which distinguished Westminster Cathedral. The Bishop of Arindela said that when Mr. Bentley died they were in great anxiety as to how the work should be carried on, but in Mr. Marshall, who for twenty-five years had been Mr. Bentley's chief assistant, they had found an able successor. Mr. Bentley's mantle had indeed fallen on him. He had done some very beautiful work in the cathedral, the gates and screen of the Blessed Sacrament Chapel being especially fine. Mr. Marshall had also prepared a design for the mosaic filling of the tympanum over the western door. As to the future decoration of the cathedral, he did not expect that any of them there that evening would see it completed, unless some providential visitor came and provided the necessary funds.



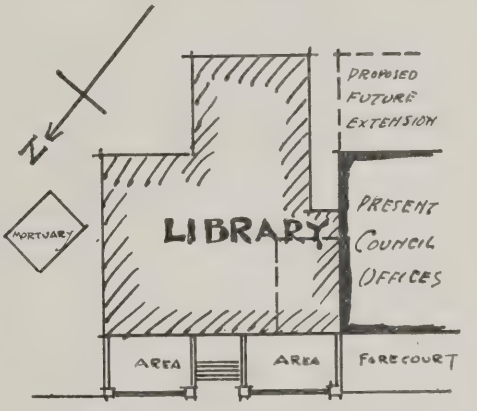
Basement Plan.



Ground-Floor Plan.



First-Floor Plan.



Block Plan.

FAILSWORTH LIBRARY. DESIGN PLACED FIRST.

FAILSWORTH LIBRARY COMPETITION.

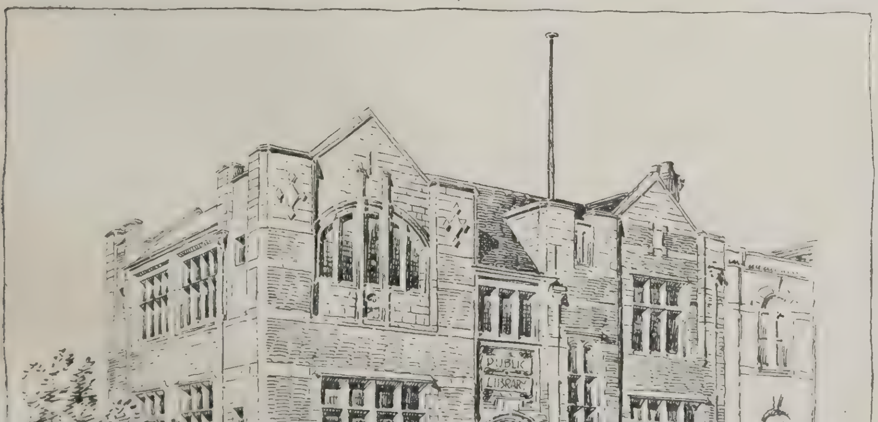
More than fifty architects submitted designs in this competition. The drawings were on view at the offices of the Failsworth Urban District Council from Thursday to Monday last. The competition has been conducted on correct lines, and the chief officials thoughtfully arranged that the assessor's report could be read through by those interested. In a prominent position in the exhibition room was a typewritten list of the competing architects, and their identifying number marked on the drawings. The various sets were also arranged and hung up in their order of merit.

With few exceptions the schemes showed a high standard, both in planning and in design. A feature in this competition has been the variety and display of clever draughtsmanship, from the carefully-finished and laboured drawing to the bold cross-cornered fat line carried to extremes by rising young men. This was all the more noticeable because, with one exception, none of the premiated designs were well drawn. Judging by the result it is quite clear that the planning has had more than its usual weight with the assessor (Mr. George H. Willoughby, F.R.I.B.A., of Manchester), as the premiated elevations were, as a rule, decidedly commonplace.

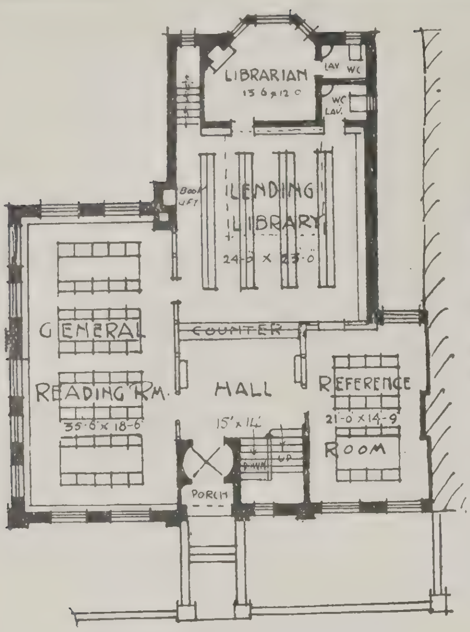
Taken as a whole, the result is fairly satisfactory, though the assessor might have given more encouragement to design and exterior effect by compromising the points in assessing, so that the architects who designed dignified and suitable elevations, with equally good plans, could have formed a greater proportion of the premiated in this competition. The final selection also shows that only one type of plan has had the assessor's serious consideration; all the premiated schemes being alike in the arrangement of the principal reading rooms. It is creditable, however, to the assessor to read from his report that instead of awarding only one premium to the 2nd placed design, he has recommended the Council to give also a third and fourth prize of £10, in consideration of the very good response the profession gave to the public invitation for designs, and because of the large number of commendable schemes submitted.

Site and Conditions.

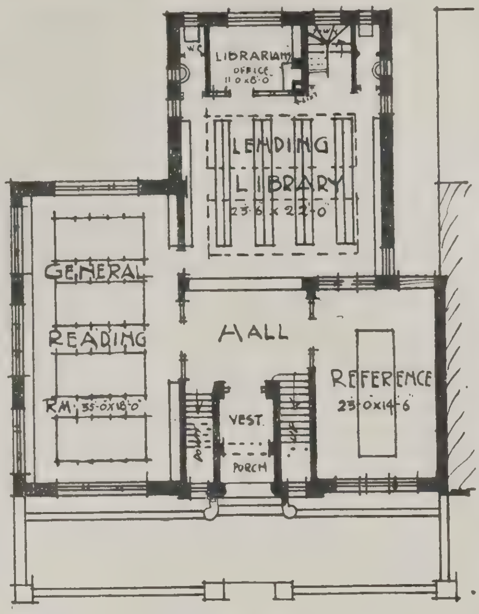
The ground set aside for the proposed library is a triangular plot of land belonging to the Council and adjoining their offices on the west side, while a canal forms the east boundary, and the main thoroughfare—Oldham Road—the north front, the limited area at the rear facing due south. Some restrictions with reference to the present Council offices required much care in planning, so as to interfere as little as possible with the existing lights on the west side of the site. The building line was also clearly defined, and the Council wisely suggested that competitors should make themselves thoroughly conversant with the site, its levels and surroundings. Competitors were at liberty to use their own judgment in arranging on their plans the accommodation asked for. The usual public rooms were required, though, as a guide to the planning, the conditions stated the names of the rooms and the floor on which they were desired to be. It was suggested that the basement should contain a bookstore-room and general store-room, with public conveniences for men only, also heating chamber and coal store. On the ground floor accommodation had to be provided for a general reading and news room, reference reading room, lending library for 15,000 volumes, librarian's room with private lavatory, &c., and accommodation for the staff (both sexes). The first floor had to contain a lecture-hall—if cost permitted—and a ladies' reading-room, with lavatory, &c., adjoining. The cost was limited to £3,000, and the estimate had to include, with the usual engineering items, all the furnishing—in fact, everything necessary for completing the library ready for use. Architect's commission and clerk of work's salary had also to be in-



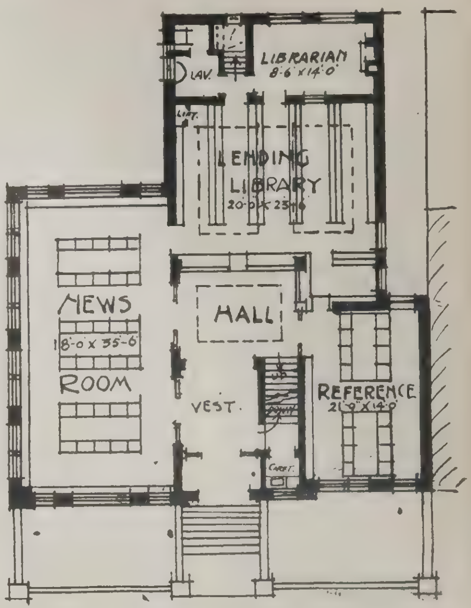
LIBRARY, FAILSWORTH, NEAR MANCHESTER. PERSPECTIVE OF DESIGN PLACED FIRST.
ERNEST OGDEN AND PERCY C. HOY, ARCHITECTS.



Ground-Floor Plan.
DESIGN PLACED SECOND.
FRANK W. MEE, ARCHITECT



Ground-Floor Plan.
DESIGN PLACED THIRD.
DAVID BIRD, ARCHITECT.



Ground-Floor Plan.
DESIGN PLACED FOURTH.
SPEIR AND BEAVAN, ARCHITECTS.

COMPETITION FOR PUBLIC LIBRARY, FAILSWORTH, NEAR MANCHESTER

cluded in the total sum. Mr. Carnegie has promised to pay for the erection of the building.

Design placed First.

This was submitted by Messrs. Ernest Ogden and Percy C. Hoy, of Examiner Buildings, Strutt Street, Manchester. The plans are well arranged, and suitable for their purpose, all the reading rooms being well supervised and directly entered from the hall. Considering the limitations of the site, this scheme meets all the requirements and conditions of the competition, though, compared with some sets, the exigencies of planning have curtailed the areas of rooms; but this point has been wisely overlooked, so that the comfort and convenience of the readers should have first consideration. A few details in the plans require altering in order that the library staff may have better working accommodation. On the basement plan it would be an advantage to utilise the four large empty rooms shown (which are already formed by the sharp drop in the ground) for a newspaper store, and as an addition to the general book store. The heating chamber ought to be entered from the outside, according to conditions, and for the sake of light and ventilation it would be necessary to have a window in the east side of this cellar. In the conveniences on this floor no direct light is shown where the urinals are placed. It would be an advantage to dispense with one w.c. and substitute a lavatory basin for soiled hands—in the same room as the urinals. This room being directly under the main entrance steps would be none too well lighted at the best, having also a north aspect. Rather many swing doors lead from the principal entrance to the hall; this is more noticeable, as they are all too close together. A small window would be an advantage beside the book lift; otherwise the attendant would have his back to the light. No objection could be raised to a window in the staff lavatory, as it would be lighted from the public area. The elevations are in a semi-Elizabethan manner, treated in the Manchester way, like a recent large school design, which was the subject of much controversy in that district. While suitable in this case, the treatment is not sufficiently dignified to warrant its adoption for other similar public buildings. A boldly-drawn ½in. detail accompanied the set, which was a creditable scheme, and looked more like being built for the alloted sum than the majority of the designs on exhibition.

Design placed Second.

This position, with £10 premium, has been awarded to the set submitted by Mr. Frank W. Mee, of Manchester. As a whole, the ground-floor plan shows more openness than the design placed first, but this is gained at a cost which is prohibitive for such an economical building as the Council required. The Van Kannel doors are an expensive item, together with the heavy constructional steelwork necessary to span almost the whole library, carrying first-floor walls and roof of lending department—42ft. clear—and also cross girders for other branch walls. Although the librarian has a larger room than in many plans, this has been gained by putting the w.c. and lavatory into one convenience; one set for the staff is entered off the lending library. A large portion of the basement area is occupied by an unpacking room and a trifling little corner as a book store. The top light over the lending library is too far back to be of much service at the borrowers' counter or to light the hall. Two sets of elevations were shown, one being something like the adjoining offices —void of any serious pretentions to architecture, but supposed to be a distant phase of Gothic; the other elevation was on more modern lines, but uninteresting. The awarding of the second premium to this set is much criticised.

Design placed Third.

This was submitted by Mr. David Bird, of Manchester, and gains the premium of £10 for a neatly-drawn set with a simple plan, which is marred by the stairs, vestibule and porch occupying too much valuable space. While the librarian can supervise the staff from his private room, the staff cannot supervise the public in the general reading-room so well, owing to the solid walling separating the lending library from the reading room. The elevations do not call for special comment, and the appearance in general of the drawings was spoilt by the strong washes of colour used. In cube contents this design must have been very large, as the building appeared to mass up in a solid substantial pile in comparison with other elevations.

Design placed Fourth.

The design which gained this position, together with a premium of £10, was submitted by Messrs. Speir & Beavan, of Cardiff. This was one of the best designs among the premiated selections, and the elevations were also carefully prepared, though rather much dressed stonework was in evidence, and detracted from the economical aspect of the scheme. The cube would not be large, and the first impression of this set of drawings was that it looked a compact building, suitable for the site, though a trifle busy in the elevations.

Other Designs.

Among the remaining designs, and all to be highly commended, were the schemes by the following architects—the first three were mentioned in this order by the assessor: Mr. Jesse Horsfall, of Manchester; Messrs. Castle & Warren, of London; Messrs. Dixon & Potter, of Manchester; Messrs. Butterworth and Duncan, of Rochdale; Mr. Edward Cratney, of Newcastle-on-Tyne; and Mr. T. Myrtle Smith, of Chelsea.

Notes on Competitions

The New County Hall.

The following notes supplemental to the conditions issued to competitors for designs for the new County Hall have been issued by the superintending architect of the London County Council:— "(*a*) Any further information required by competitors must be applied for to the assessors, and addressed to the County Hall, Spring Gardens, London, S.W., in the form of separate questions, on or before Wednesday, May 1st, 1907, after which date no further questions can be considered. (*b*) These questions which it is necessary to answer will be replied to, and the information supplied to all competitors; such replies will then form part of the conditions. (*c*) For the immediate information of competitors, the scale for the drawings for the preliminary competition has been definitely decided by the Council to be 16ft. to an inch; and in view of the possibility of most of the competitors having considerably advanced their design, no alteration in the scale can now be made."

Baths for Nechells, Birmingham.

The Baths and Parks Committee held a special meeting last week to further consider the competitive designs sent in by six firms of architects for the proposed new baths at Nechells. Finally they decided to recommend the City Council to adopt design No. 4, which was found to be that of Mr. Arthur Harrison, of Birmingham. The other competing architects were—Messrs. Henman and Cooper, Crouch and Butler, W. Hale and Son, Cossins, Peacock and Bewlay, and Wood and Kenrick.

Sunderland Libraries Competitions.

In the two local competitions for branch libraries to be erected at Sunderland the first and second premiums in each case have been awarded to Mesrs. Davidson and Cratney, of Sunderland and Newcastle. Mr. J. T. Cackett, F.R.I.B.A., was the assessor. Forty-three designs were submitted. In connection with this competition a question as to the definition of "local" was raised at last week's meeting of the Town Council. A member wanted to know whether the firm in question practised in the town. The Town Clerk said it was stipulated that competitors should be architects practising in the borough, and the firm in question had offices in Fawcett Street. As to how far a man was a local architect by having offices in Sunderland was rather a profound question, which he was not prepared to answer.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
April 30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May 7	ELEMENTARY SCHOOL AT HADFIELD, GLOSSOP.—(For 300 children). Architect placed first to be entrusted with the work: second premium of £20. Limited to architects practising within 30 miles of Glossop. Conditions from J. Walkden, Secretary to Education Committee, Howard Chambers, Glossop. Deposit, One guinea,
May 11	SCOTTISH NATIONAL EXHIBITION AT EDINBURGH. — Premiums of £100 and £75. Conditions from J. Marchbank, 45 York Place, Edinburgh, Deposit, One guinea.
May 17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
No date.	HIGHLAND MANSES AND CHURCH BUILDINGS for United Free Church of Scotland. Conditions from J. T. S. Watson, 1, Castle Terrace, Edinburgh. Deposit, Two guineas.

A NEW COMPETITION FOR READERS.

With the object of adding still more to the interest which is being taken in our "Architectural Dis-Orders Competition," we have decided to offer, in connection with it, a prize of one guinea for the best two sketches for inclusion in the series. The drawings must be in ink, with no wash about them, and about double the size of the reproduction. They must be sent in by May 2nd. We reserve the right to use any of them.

IN PARLIAMENT.

(By our Press Gallery Representative.)

Public Buildings.

The first sitting of the House of Commons after the Easter Recess was devoted to the consideration of a number of votes for which the Office of Works was responsible. In the course of the discussion Mr. Morton interrogated the Chief Commissioner about Holyrood Palace Chapel, the restoration of which the trustees under Lord Leven and Melville's bequest decided not to proceed with.

Mr. L. Harcourt, in reply, said that what he desired to do was not to hand over the Palace to restorers, but simply to preserve what remained.

Mr. Akers Douglas (who was First Commissioner under the late Government for some years) wished to have a statement with regard to the erection of official residences for the First Lord of the Admiralty and the Senior Naval Lord at the end of the processional avenue, or rather the Mall. He hoped the work would be proceeded with on the plans of the late Government. He also alluded to the vote of £5,000 on account of the extension of the National Gallery over part of the St. George's Barracks site. He hoped that part of the Barracks which might prove a source of danger from fire would be removed. He asked for details as to the casting of the statue of "Physical Energy," by the late G. F. Watts, R.A., and the site for its erection. He noticed that a beginning had been made with the arch over Charles Street, Whitehall, connecting the new with the old buildings. It was felt that the arch as originally planned would do much to hide the difference in the street alignment, and he wanted to know if the original plans were to be adhered to.

Mr. Harcourt, referring to the new Admiralty buildings, said he hoped the name of "Processional Avenue" would not be applied to the new thoroughfare, but that the old historic name of "The Mall" would be retained. The foundations of the new buildings were finished, and the superstructure was now rising in accordance with the original plans, with the exception of alterations on one or two windows. The vote for the National Gallery marked an advance in the policy of the Board of Works, and it would pledge the Government to the removal of, at all events, a part of the Barracks, which were now a source of danger and a disfigurement. The casting of the "Physical Energy" statue had been slower than was expected. It had been found impossible to erect it on the bridge at the end of the Serpentine, as it would have been ludicrously out of proportion to the bridge. He thought he would be able to find a very fine and dignified place for it in the broad avenue which leads up from the Serpentine to the Round Pond at Kensington Gardens. He intimated that the new stationery warehouse would not go at the back of the Tate Gallery as originally intended, the ground being left available for extensions of the Gallery building. The new warehouse would be erected in Eldon Street. As to the Charles Street arch, there was no truth in the rumour that it was intended to knock out a portion of the design. It was being erected according to the original design, except that a small amount of statuary had been added, which was not properly shown in the original drawing. Replying to further questions about the new Admiralty wing, the expenditure of £80,000 upon this work having been objected to by several members, Mr. Harcourt said the plan was the plan of the late Government. The buildings in question were to end the Mall, and they were to be ornamental as part of the Queen Victoria Memorial scheme.

Mr. Bryce expressed a hope that the buildings would not be so offensive to public taste as the Government offices recently completed in Whitehall. He said it would be difficult to imagine anything more monotonous, tedious and unworthy of the nation than the new War Office. He asked when the Mall would be opened into Charing Cross.

Mr. Harcourt said the Mall could not be opened till the new buildings were finished. He was afraid that would be more than one year from now.

Our Plates

The Baldachino at Westminster Cathedral.

This was designed by the late Mr. Bentley, and its importance may be gauged from the fact that some time before his death he wrote: "I have spent a great deal of thought upon it, and I think it is the best thing about the cathedral." Mr. Bentley's design has been carried to completion by Mr. John A. Marshall, who has been the late architect's *alter ego* on the cathedral.

The work is a development of the old Sant' Ambrogio (Milan) type of baldachino. It is situated in the sanctuary, which is 4½ft. above the level of the nave, with the chapel of the Blessed Sacrament on the one side and the Lady Chapel on the other.

The altar consists of a huge block of grey Cornish granite, fine-axed but unpolished, 12ft. long and 4ft. wide, whereon are set the six great candlesticks and the crucifix. The altar weighs 14 tons, and in transporting it from the quarry to the cathedral a cost of more than £100 was incurred.

The baldachino consists of eight beautiful columns of yellow Siena marble resting on plinths of Verde Antico inset with panels of purple Brescia, and supporting a canopy of marble lavishly ornamented with a mosaic of mother-of-pearl and lapis lazuli. The magnitude of the work will be apparent when it is stated that the canopy reaches to nearly 40ft. above the floor of the sanctuary.

It may be mentioned that it was Bentley's original intention that the canopy should be supported by columns of onyx, and these in fact were produced at great labour and expense and ultimately transported to the cathedral, though, owing to the brittle nature of the material, three of them were damaged in transit, two of them being broken completely in half. (These columns are now in one of the side chapels, some of them still in their wooden casings.) It was Cardinal Vaughan who decided to use Siena marble instead of these onyx columns, as it was considered that the yellow colour of the Siena marble had a richer effect than the colder colour of the onyx. It was Cardinal Vaughan also who made an alteration in Bentley's scheme for the altar, as it was the architect's original intention to have an altar on the same large scale as the baldachino.

On the left of the baldachino is the Archbishop's throne, and at the back is a curtain designed by Mr. Marshall.

The cost of the new altar and baldachino has been more than £20,000.

THE BUILDING TRADES' EXHIBITION.

We give in this issue our concluding notices of the exhibits at the Building Trades' Exhibition at Olympia, which closes on Saturday next. The exhibition has been very well patronised, and from all accounts it is likely to do a great deal of good to the building trade.

Stacey's Hand-Power Winch.

The address of Messrs. G. Stacey & Co., makers of the hand-power winch which we illustrated in our issue for last week, is 66, Lorrimore Road, Walworth, S.E., not New North Road, Walworth, as stated in our columns. Everyone visiting the exhibition should not fail to see this winch in operation at stand No. 43, row A. It raises materials rapidly, and can be worked in various positions, from above the work or from the ground level, and over jenny-wheels. To a height of 100ft. a supply of material can be obtained in one minute: a pail, basket, &c., full of material, going up, while an empty basket, pail or sack of rubbish is coming down.

Ironmongery.

Mr. James Gibbons, St. John's Works, Wolverhampton, and 9, Southampton Row, London, has an interesting exhibit at stand No. 51, row B, of locks and brass foundry, opening gear, casements and safes. His locks have a reputation of many years. One of the latest buildings fitted throughout with his locks, furniture and casements is Belfast City Hall (Sir A. Brumwell Thomas, architect). Mr. Gibbons also makes a feature of asylum and school work. Among the great number of patents shown are:—The "E.C." reversible window, compensating roller axle pulley, panic bolts for theatre and public hall doors, a new lever action flush bolt which requires very little letting in, a number of floor springs suitable for every requirement, and steel casements and sashes with special welded joints. Electric light fittings in bronze, metal and enamel are also shown.

Copies of Drawings.

Whereas the "blue" print used to be universally employed when architects and engineers required duplicates of their drawings, nowadays the several varieties of the "black line" process have come extensively into favour. The "blue" print is excellent so far as it goes, but of course it is quite impossible to colour up such prints, as architects especially wish to do, and that is why the facsimile prints in black and white have been adopted. In those processes, however, where the paper is treated with water there is great liability to shrinkage, with the result that it is of course quite impossible to scale off the drawings. Hence the "True Scale" process of photo lithography is of special merit. In this process the paper is not treated with water, or anything else that will cause it to shrink, and the resultant prints are absolute facsimiles of the originals. This system is to be seen in the gallery at the stand of Messrs. Vincent Brooks, Day & Son, Ltd.

A Good Exhibit of Timber.

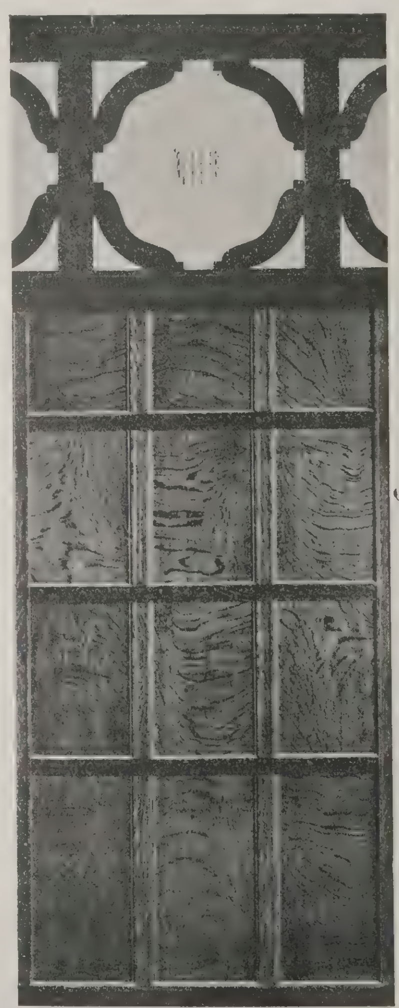
Messrs. George F. Arney, Ltd., of 55 to 59, St. George's Road, S.E., have a good exhibit of timber at wall space No. 152. Many fine specimens of mahogany, pine and other wood are here shown, these being all carefully selected, and partially polished.

Drainage Fittings.

At special position No. 23 Messrs. John Knight & Sons, of Chelsea, exhibit a number of patent drainage fittings in cast-iron. A special feature is made of the firm's cast-iron inspection and disconnecting chambers, while other exhibits are of patent access caps, gulleys, manhole covers, etc.

"Tudoresk."

This is an oak panelling made entirely polished at 1s. 6d. per sq. ft. Messrs. H. C. Cleaver, Ltd., of 3, Eden Street, N.W., show it at stand No. 110, row F. The panelling is genuine, with oak frames 1in. thick, and at the time of fixing is built up section by section by a system of interlocking grooves and tenons, each piece being secretly nailed to the wall.



"TUDORESK PANELLING"

"Solignum."

Messrs. Major & Co., Ltd., of Hull, have an attractive stand at special position No. 1 in the form of a house built of wood, which is stained throughout with "Solignum." This stain is obtainable in three shades of brown, three shades of green, and also purple. It can be used for all classes of woodwork, both external and internal, the exhibits at the stand showing it applied to deal, oak, &c., with plain, varnished, and beeswaxed surfaces. It is generally intended, however, that the wood shall be left plain after staining. The stain penetrates well into the wood. Its covering qualities are about 200 to 300 sq. ft. per gallon. It is also a preservative, and can in this way be used for coating woodwork underground. As a preservative against dry rot it is also useful, and in tropical countries it is being used extensively as a protection against the ravages of the white ant. No vermin will touch wood treated with "Solignum." It can also be used for stone and brick-work as a damp-protective coating.

Decorative Glass and Letters.

At stand No. 73, row C, Messrs. Caspar & Co., of 33, King's Road, St. Pancras, N.W., exhibit a variety of decorated glass, sand-blasted, embossed, and otherwise treated; an extensive selection of fascias, signs, letters, &c., being also shown. The firm make a speciality of crystallised gold and silver work on glass, and brilliant letters are also an important feature of their work.

Wood-Working Machines.

At wall space No. 162 Messrs. F. W. Reynolds & Co., of Edward Street, Blackfriars Road, S.E., have an exhibit of wood-working machines, these including a combined circular and band saw machine, with tenoning, shouldering and boring apparatus, vertical spindle machine, mortising machines, &c.

Kupron.

The uses of "Kupron"—an electric deposit of metal—are shown in a remarkable way at stand No. 102, row F, by Messrs. Kupron, Ltd., of Clapham, the exhibits ranging from small beadings for decoration work to a 10ft. figure of Mercury for the new municipal buildings at South Shields. Copper and other metals can be deposited by the process for every class of work, not the least effective being the door furniture and electric-light fittings thus treated.

"Xelite" Plaster and Reconstructed Stone.

Three special materials are shown by Messrs. Clark & Co., of 32A, Westminster Palace Gardens, S.W., their stand (No. 68, row C) being an effective architectural treatment built of "Reconstructed Stone," finished inside with "Xelite" plaster, and having a dome lined with glass mosaic. "Reconstructed Stone" is made up of 90 per cent. of stone dust, and the patentees (Messrs. W. G. Crotch & Son, of Norwich) claim that, being a uniform mass, and having no bed, it resists the weather far better than natural stone. "Xelite" plaster is intended as a substitute for Keene's or parian cement, being claimed to be a distinct improvement in cheap hard plasters, while the mosaic shown is of English manufacture, with the colour on the back instead of on the face, as in Venetian glass; it presents a similar appearance to this latter, but is only half as costly.

Plumbing.

Messrs. Davis, Bennett & Co. have two large stands, bays 13 and 14, where they are showing a fine collection of sanitary fittings of special design. Amongst those we would call attention to are the glazed ware sinks with combined skirting, all in one piece. The w.c. cisterns are of much beter form than ordinarily. Specimen bathrooms are fitted up with novel forms of shower baths, and slipper baths of good form and finish. One particular novelty is a cistern which draws air from the w.c. compartment and expels it through the wall, thus ensuring proper ventilation.

Wood Mantels, &c.

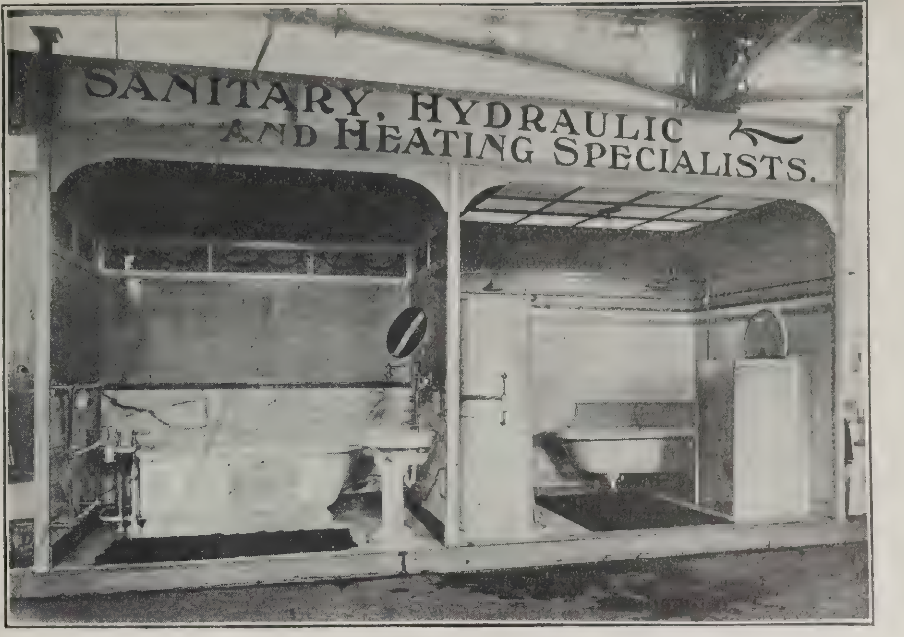
High-class wood mantels, panelling, &c., are shown at stand No. 131, row G, by Messrs. W. Walker & Sons, Ltd., of 119, Bunhill Row, E.C. Walker's "Bunhill" fire and "Bunhill" kitcheners are also shown.

Patent Glazing Bars.

Mr. Sam Deards, of Harlow (London office—88, Chancery Lane, W.C.), shows at wall space No. 241, in the annexe, a small roof illustrating the application of his patent glazing. The bar used gives a good hold on the glass, and the lead cap is easily removable. A good recommendation of this bar is that 102,000ft. super of the roofs of the new steam factory at Portsmouth Dockyard are glazed with it. A speciality is also made of steel roof principals at a very cheap rate, for builders' use.

Safety Treads.

Non-slipping treads are shown at stand No. 255, row T, in the annexe, by the Safety Tread Syndicate, Ltd., of 15, Barbican, E.C. In section, these consist of a series of grooves filled in with a non-slipping material that gives a good foothold.



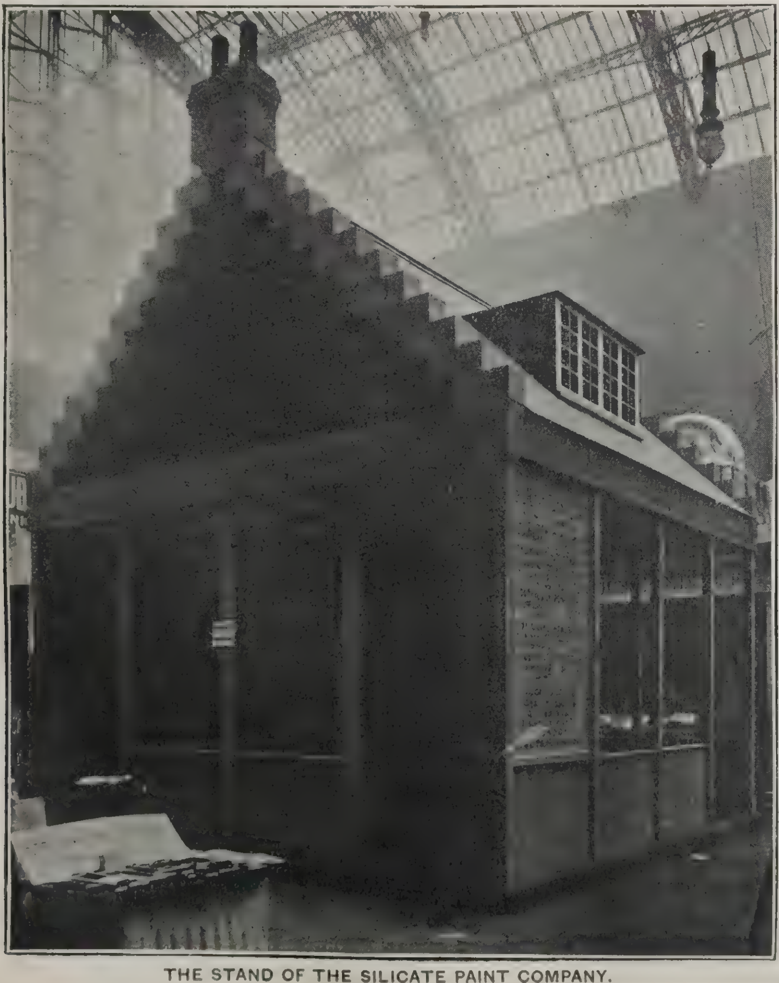
THE EXHIBIT OF MESSRS DAVIS, BENNETT & CO.

Asphalted Roofs and Tar-macadam.

At stand No. 11, row B, in the gallery, Messrs. Josiah Smart & Son, of 53, Victoria Street, Westminster, show models illustrating their method of asphalting steel and concrete roofs, boarded roofs, &c., together with examples of raw asphalt and bitumen. Models are also shown to illustrate the method of laying tar-macadam for roadways and footpaths.

Glazing.

Messrs. Helliwell & Co. are showing in the gallery their "Perfection" Patent system of glazing with their new forms of glazing bar. Messrs. Helliwell's system has been adopted for very many important contracts by eminent architects and engineers, and time has proved its efficiency. A special feature has been made at the stand of their patent "Openshut" louvre ventilator, which is worked from the ground level by rods and a screw gearing.



THE STAND OF THE SILICATE PAINT COMPANY.

Limmer Asphalt.

The exhibit of the Limmer Asphalt Paving Co., Ltd., of 2, Moorgate Street, E.C., is in the gallery at bay 16a, where models are shown representing mineral rock, mastic roofing, stable and coach-house floors, damp-courses, and "Lithofalt" bituminous concrete foundations for preventing vibration from machinery. Samples of raw asphalt, mastic blocks, &c., are also shown, as well as Bishop's patent tread.

Karri and Jarrah Paving.

A very interesting exhibit is that of Messrs. Millars' Karri and Jarrah Co. (1902), Ltd., of 72, Bishopsgate Street Within, E.C. This firm shows at bays Nos. 20 and 21, in the gallery, a number of examples of paving in karri, jarrah, and blackbutt, together with jarrah fencing and gates, woodblock flooring, &c. These woods are very durable, and have many qualities which make them of particular service for municipal and other work.

"Duresco."

Amongst the most attractive exhibits at Olympia is that of the Silicate Paint Co., at special position No. 15. This takes the form of a house decorated inside and out with the well-known washable water paint "Duresco." Outside one sees a tiled roof, lined bricks, and a good imitation of rough-cast in "Duresco," while the interior further exemplifies the capabilities and beauty of the material. The walls show the peculiar softness of "Duresco," the frieze decorations adding considerably to the general effect. Some twenty panels decorated entirely with "Duresco" are also exhibited, giving a wide range of colour schemes. The decorations are carried out by stencil work, and the cost of reproduction in a practical way is within the reach of all.

Concrete Building Blocks.

The Swansea Stone Block and Machine Co., of New Cut, Swansea, exhibit at wall space No. 233, annexe, a small house built with their hollow concrete blocks; machines for making these blocks being also shown. These machines (of American invention) work as follows:—The mixture is shovelled into the machine, waste being prevented by the hopper. The concrete is then tamped by hand with rammers until the mould box is full and solid, the finishing of the top being done with a cast tamping plate in the shape of the top of the stone. Before the tamping plate is removed, the cores are withdrawn and placed on the next pallet. The cores are provided with guides so that they will go to their exact places, and as they are placed the handles on top are given a slight twist, which locks them securely to the pallet. The machine is then lifted off the finished stone, the sides falling apart automatically, and as it is placed on the next pallet the sides go together again.

Joinery and Wood-block Flooring.

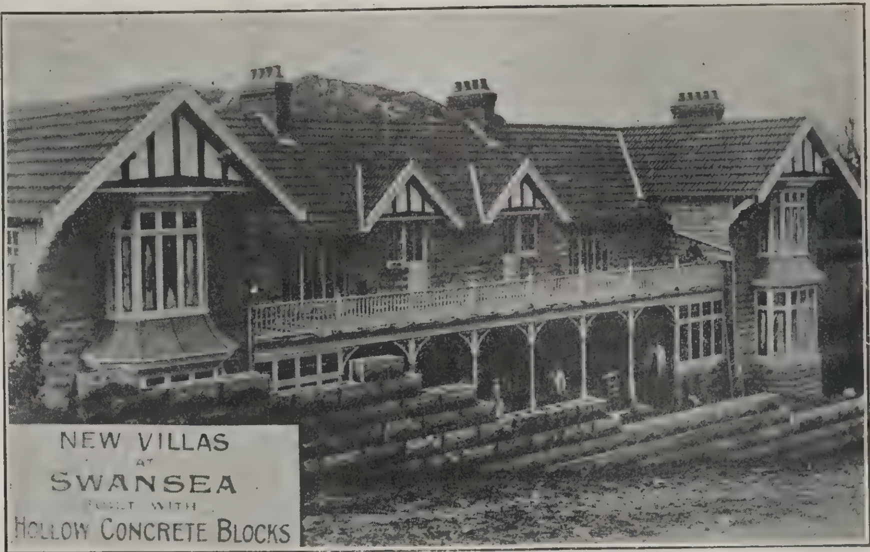
Messrs. W. H. Lascelles & Co., Ltd., of 121, Bunhill Row, E.C., exhibit, at bay No. 24, specimens of high-class joinery in soft and hard woods, and all who are interested in this class of work should see this exhibit. There is also shown the patent "Rhombus" wood-block flooring, as well as Lascelles' patent concrete dressings, slabs, &c.

Modern Bathrooms.

Messrs. Shanks & Co., Ltd., of Barrhead, have at bay No. 5 an elaborate display of modern bathroom fittings, comprising baths of numerous kinds, lavatories, closets, &c., all carried out in excellent style.

Hall's Distemper.

The accompanying illustration shows the stand (No. 91, row D) of Messrs. Sissons Brothers & Co., Ltd., of Hull, and 199b, Borough High Street, S.E. The bungalow shown is treated throughout with Hall's washable sanitary distemper in various tints, with artistic stencilling, and the various special enamels and paints which Messrs. Sissons manufacture are applied to different parts of the structure to show their finish and colour.



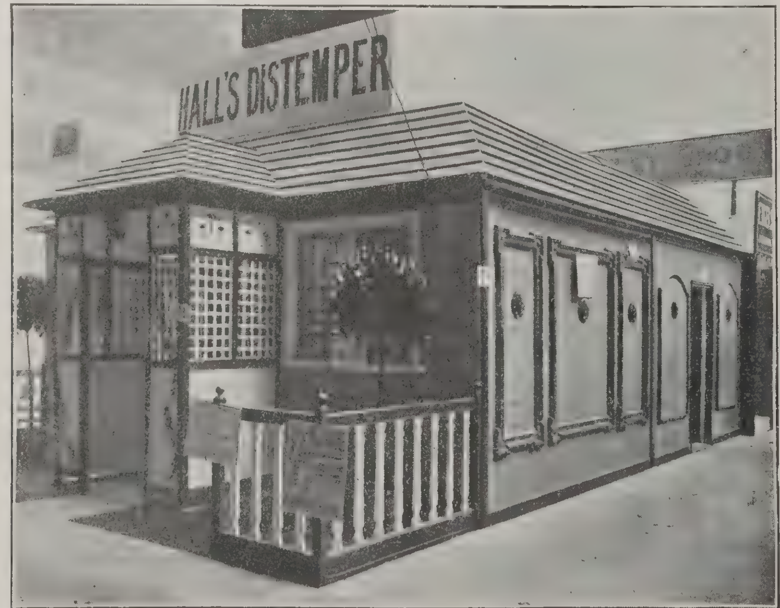
(BUILT OF BLOCKS MADE BY THE SWANSEA STONE BLOCK AND MACHINE CO.)

"Doloment" Flooring.

The new jointless flooring called "Doloment" is shown at stands Nos. 202 and 203, row N, annexe, by the British Doloment Co., of Royal London House, Finsbury Square, E.C. By the patented method and material utilised, and the elasticity of the intermediate layer, "Doloment" overcomes the great difficulty which has hitherto been associated with jointless floors, so that although the foundation upon which it is laid may settle or crack, the surface remains unaffected. "Doloment" can be laid on any surface, whether concrete, cement, or wood, and is absolutely non-porous; it is therefore impervious to dust, liquids, &c. It can also be made up to imitate mosaic, being producable in almost any colour, and can be finished with a surface like polished marble. Although only recently introduced into this country, the firm have secured contracts for laying "Doloment" for H.M. Office of Works, War Office, London County Council, &c.

Interlocking Rubber Tiling.

This is shown by Messrs. A. L. Gibson and Co., of Tower Street, W.C., at their stand in the annexe (No. 214, row O). It is a special preparation of rubber made into tiles ⅜in. thick, and of such shape as to form an interlocking joint, so that, however large the area, the tiling is practically an unbroken sheet. As a floor covering it is noiseless, non-slippery, waterproof, durable and absolutely sanitary. Another exhibit at this stand (besides the rolling steel shutters to which we referred last week) is Cabot's Sheathing and Sound-deadening Quilt. This is made of eel grass quilted between two layers of tough manila paper. The long fibres of eel grass cross each other at every angle, and form innumerable minute spaces of "dead" air, making a soft elastic cushion, which is a wonderfully effective non-conductor. Cabot's Creosote Stains are also shown.



THE EXHIBIT OF MESSRS. SISSONS BROTHERS & CO.

Damp-course and Sheeting.

Messrs. Watson and Co., of Reliance Works, Barnes, show at stand No. 44, row A, their "Reliance" lead and bitumen damp-course and sheeting, for insulating and rendering damp-proof structures of all kinds, ironwork, etc. Bitumen damp-courses have long been on the market, and are highly valued, but their weak point has been a tendency to squeeze out under heat, and a tendency of walls to travel. Messrs. Watson and Co. have patented a system whereby the bitumen is corrugated, thus enabling the mortar to dovetail, and obviating any likelihood of walls travelling. They call this "Defiance" dampcourse, and it is worth inspection, being cheaper than their "Reliance."

Broseley Roofing Tiles.

At stand No. 232, row Q, in the annexe, the Coalbrookdale Co., Ltd., of 15-16, Rathbone Place, W., have a very interesting exhibit of Broseley roofing tiles, the "Lightmoor" variety being one of the best. These tiles are made from clay peculiar to the neighbourhood of Broseley and Lightmoor, in Shropshire, and great care is taken in their manufacture. It should be noted that these genuine Broseley tiles are branded "Broseley" on the back, so as to distinguish them from other tiles which are sold as "Broseley coloured," but which really are not made in the Broseley district at all.

"Ronuk."

This sanitary polish, which can be used for various kinds of floors—particularly wood-block floors—can be seen in the gallery at stand No. 43, row B, where it is exhibited by Messrs. Ronuk, Ltd., of 86, York Road, Lambeth, S.E.

Oliver Typewriters.

A number of these machines are shown at stand No. 109, row F, by the Oliver Typewriter Co., Ltd., of 75, Queen Victoria Street, E.C. The special features about the "Oliver" typewriter are that the writing is visible to the operator, and the machine is fitted with inter-changeable carriages of different type.

A new Enamel.

Messrs. Duggan, Neel & McColm, Ltd., of Millwall, E., exhibit at stand No. 209, row N, annexe, their new "Dodo" enamels and japans. The "Dodo" enamel has taken the firm a long time to produce, but they have succeeded at last in producing an enamel which seems to overcome all the ordinary difficulties that painters have been accustomed to expect with this class of paint. An enamel cannot be applied successfully unless it is thin, but some enamels on the market become thick after being kept for some time; they look very well when first put on, but the surface soon dries, and leaves the interior still liquid; it then sags, and produces ridges and furrows all over the surface. "Dodo" enamel is free from such defects; moreover, it is made with pure zinc white, and there is no lead in its composition, so that it is not liable to discolouration. "Dodo" can also be dull-polished by rubbing it down with fine pumice powder and finishing with putty powder and linseed oil, the surface thus produced being extremely delicate. For the present, "Dodo" enamels are made in white, ivory white, and cream, but they can be coloured with tube pigments supplied by Messrs. Duggan, Neel & McColm. "Dodo" flatting, which, as the name implies, is a flatted enamel that dries with an egg-shell surface, requires no rubbing down. In the application of the "Dodo" enamels a special under-coat made by the firm will be found of service. This is a mixture of genuine English white lead and a specially fine snow-white oxide of zinc ground in linseed oil.

Joinery.

Messrs. Samuel Elliott & Son, Ltd., of Reading, have a large stand, No. 128, row G. A portrait of Mr. Samuel Elliott is in evidence with the inscription that he is a pioneer of the trade, which is a fact. Mr. Elliott has received the confidence of many well-known architects, and has carried out a great deal of beautiful joinery work. The examples shown at this stand, while they exhibit the superior character of the workmanship of the firm, are by no means so striking as many of their completed examples in well-known buildings erected in recent years. For instance, a photograph on the stand shows the large main doors of Westminster Cathedral executed to the late Mr. J. F. Bentley's design.

An Instantaneous Water Heater.

Mr. W. M. Glendinning exhibits his instantaneous water heater at stand No. 256, row T, in the annexe. This is one of the very best for heating water for baths, and it has also been applied to the supply of hot water for the whole of a house. It is undoubtedly an improvement on the ordinary geyser. The water is not heated in bulk, but courses through tubes wound through the heater. It has thus the form of a multitubular boiler with a gas burner. Cold water entering at the top can pass directly through, and yet be boiling when it reaches the tap. A ball-valve can be inserted so that there is a continuous supply from the main.

To show where the Drains are.

At stand No. 5, row B, in the gallery, Mr. Henry Dean, of Stechford, near Birmingham, is showing several of his patent sanitary specialities. These consist of indicators which show the exact position and depths of drains and pipes below the surface, and save much time and trouble for architects, surveyors, &c. The indicating bricks for paving show the entire course of house drains, and their depth clearly and accurately denoted on the surface as if the trenches were open.

Empire Stone.

At bay 26 in the gallery the Empire Stone Co., of 231, Strand, London, have a striking exhibit of artificial stone made with Portland cement concrete, manufactured by the wet process of moulding. It is to be noted, in view of the importance which the subject now attracts, that this firm undertakes the execution of reinforced concrete work. They have no special system. The importance of engaging a contractor who knows how to make concrete has been brought home to us by several accidents that have occurred abroad recently. Inferior quality concrete is the very worst economy, and most dangerous. Firms who have had many years' experience in the manufacture of concrete are the best guarantee of good work.

Patent Victoria Stone.

The Patent Victoria Stone Co., Ltd., 10-13, Hamilton House, Bishopsgate Street Without, E.C., have an exhibit at stand No. 21, row B, in the gallery. This stone has been extensively used both for paving work and for architectural work. As paving it has stood a test of 39 years' traffic in London, having been used in some of the most trying places—such as at London Bridge. For architectural work it can be obtained in a variety of colours, to match Portland, red and yellow Mansfield, and other stones. It has the porosity of marble, compares in price favourably with Bath stone, and is very suitable for carving.

"Opalite."

This well-known wall tiling is shown at stand No. 18, row B, in the gallery, by Messrs. William Griffiths & Co., Ltd., of 35-39, Hamilton House, Bishopsgate Street Without, E.C. "Opalite" has been extensively used in recent years. At this stand also are shown granite setts and curb of all descriptions.

Fires and Ranges.

Messrs. Wilmer & Sons, of Bury Street, St. Mary Axe, London, E.C., have a striking series of exhibits, chiefly showing fireplaces at their stand, wall spaces No. 175 and 176. We particularly single out the patent "Bond" fire. This is of the barless type of fire, the hearth being level with the floor; there is no cold sub-stratum of air at the floor-level as occurs with a raised hearth. It is economical of coal consumed, and it is shown in one case with a patent tubular boiler attached for supplying hot water to bedrooms, bathrooms, &c. The "Sine qua non" range, also exhibited, has flue sides, so that perfect top and bottom heat is obtained, thereby giving a uniform temperature for roasting and baking. It is simple in action, and can be quickly converted from a closed to an open fire.

Cavity Building Blocks.

At bay No. 2 an exhibit of concrete blocks by the Cavity and Ventilating Building Block Syndicate, Ltd., is of interest. These are being extensively used at Walton-on-Thames and Harwich. The wall is built in two thicknesses, with a cavity between, keyed together by smaller dovetailed blocks. This firm also makes concrete blocks for many purposes.

Carron Stoves.

Bay No. 18 is occupied by the Carron Co., of 15, Upper Thames Street, E.C. Here, in many varieties, are shown the grates which the company have made so widely known. They are derived from old patterns, and are very restrained in design, but withal have a quiet restful effect which is most pleasing. Numerous types of stoves, interiors, dog-grates, hearths and mantels are shown, the exhibit altogether being a very effective one.

THE EXHIBIT OF THE CARRON COMPANY.

Joinery.

Elliotts' Moulding and Joinery Co., Ltd., of Newbury, exhibit some excellent examples of joinery at special position No. 25. This firm, the old original manufacturers of high class joinery and mouldings, has done much work for eminent architects. Their workmanship is of the very best. Their exhibit comprises the front entrance to New York Lodge, Bourne End, in oak and yellow pine, to the designs of Messrs. Heath & Sons, of 154, Cromwell Road, S.W., for Mr. G. A. Kesler, of New York; also part of the solid Spanish mahogany billiard-room panelling for the same place, a portion of Spanish mahogany dado for the Capital and Counties Bank, Weston-super-Mare, a hygienic door for hospitals, &c., together with the usual range of sample pieces of dado in French and Italian walnut, satin wood, bird's eye maple, brown oak, teak, mahogany and walnut, also mouldings in the same kinds of wood, and a specimen piece of panelling as used for the Masonic Temple, Café Royal.

"Windmill" Tiles, &c.

Messrs. Watson Nelson, Ltd., whose works are at Napton-on-the-Hill, near Rugby, exhibit at stand No. 38, row A, their "Windmill" patent roofing tiles, ridges, finials, &c. Their patent fluted-faced tiles have channels running to within about 2ins. of the bottom edge, and effectually prevent rain driving under; they are particularly serviceable in flat-pitched roofs. The firm also makes adamantine paving bricks, pipes, &c.

Rock-Concrete Sanitary Goods,

Rock-concrete tubes and man-holes, together with stoneware pipes and fittings of Dorset clay, gullies, &c., are shown at stand No. 103, row F, by Messrs. Sharp, Jones & Co., of Parkstone, Dorset. The most noteworthy feature is the "Brandram" pipe joint. This consists of a steel band coated with bitumen. The pipes do not need socketed ends. They are butt-ended, or with a rebated or ogee joint contained in the thickness of the pipe. The steel band is fairly wide, and is not quite so long as the circumference of the pipe. Its ends are curled over, and the steel is treated with Dr. Angus Smith's solution, being further protected by dipping it into bitumen. The pipes are butted, and the steel band is pulled tightly round the joint by means of a screw clamp, a staple being finally inserted in the curled over ends. In this way a very tight but non-rigid joint is obtained. The pipe can be readily removed to insert a junction, &c., and there is obviously great saving in time and labour. The strength of joints made with the "Brandram" steel band has been tested on many occasions, and it has always been the pipe that gave way and not the joint. With stoneware pipes a pressure of 100lbs. has been withstood, and with iron pipes 300lbs. The joint has been used with sewers of 42ins. interior diameter through very wet ground.

The Sanitary Publishing Co., Ltd.

This publishing firm, of 5, Fetter Lane, Fleet Street, E.C., exhibits at stand No. 143, row H, a number of its standard books on hygiene, public health, water-supply, and sewage, building construction, &c. "The Sanitary Record and Journal of Municipal and Sanitary Engineering" (published every Thursday, price 3d.) is also shown.

THE EXHIBIT OF ELLIOTTS' MOULDING AND JOINERY. COMPANY, LIMITED

The Van Kannel Door.

This well-known door is shown in the annexe, at stand No. 222, row P, by the Van Kannel Revolving Door Co., Ltd., of 27, Great James's Street, Bedford Row, W.C. The door has four wings or arms mounted on a central pivot, and revolves within a circular casing in such manner that two of the arms are always in contact with the two opposite segments, while, when desired, the arms can be folded flat against one another, so as to allow a free passage, and, if further space is needed, the arms can be slid to one side, this leaving the full opening of the doorway unobstructed. The special advantage of the Van Kannel door is, of course, that it prevents draught, and for this reason is extensively employed in hotels and other similar buildings.

Reversible Sashes.

"The Unique" reversible window sash is shown at stand No. 223, row P, annexe, by Messrs. Martins' Patents Co., Ltd., of 16, Water Lane, Great Tower Street, E.C. This reversible sash is very simply operated, and works with great ease. For asylums it is adapted so that the sashes cannot be raised or lowered more than a few inches, nor reversed for cleaning, without a key which is in the keeping of the attendant, the sashes locking automatically when turned back into their ordinary vertical position.

Granite-Concrete.

Messrs. John Ellis and Sons, Ltd., of 1, St. Martin's, Leicester, exhibit at stand No. 28, row B, in the gallery, granite-concrete sewer tubes (armoured and unarmoured), as well as invert blocks, paving slabs, &c., made of the same material.

Electrical Fittings.

An extensive variety of electrical fittings of all kinds is exhibited in the annexe at stand No. 219, row O, by Messrs. F. A. Glover & Co., Ltd., of Vine Street, Clerkenwell Road, E.C. These fittings are very artistic in design, and well finished. They should be seen by all who are interested in the matter.

"Plastoment" Asbestos Flooring.

This fire-resisting flooring is shown at stand No. 181, row L, annexe, by the Plastoment Asbestos Flooring Co., Ltd., of 22, Lamb's Passage, E.C. The feature of this flooring is that it is laid in a plastic state in two layers of ⅜in. each, a total thickness of ¾in. The first layer is specially insulating, while the second is a finishing coat, which can be either plain or in a combination of colours, with a fine and even surface. "Plastoment" can be laid on almost any kind of surface, excepting lime and plaster. For factories, mills, warehouses, &c., and places where appearance is not a first consideration, the cost is about 4s. 6d. per yd. super and about 5s. per yd. super for barracks, hospitals, &c., ornamentation being given at slightly additional cost. "Plastoment" is very suitable for repairing worn wood or stone steps, and it can also be obtained in slab form, ready for fixing as stud partitions, &c. It is light in weight (about one-third that of cement paving), and claims to combine all the advantages of terrazzo and wood-block flooring. In cases where a single layer of Plastoment floor only is desired "Unalith" (made of material somewhat similar) can be supplied at about 9d. per yd. super less than "Plastoment."

Architectural Photographs.

The "Architectural Review" Photographic Bureau, which has a special screen in the annexe, of which we illustrate one side, has been instituted by the proprietors of that magazine to meet the desire of architects and others to obtain the best possible architectural photographs. The "Architectural Review" has been frequently requested to undertake the photography of buildings on the ground of the excellence of the views appearing in its pages, and the Bureau is the practical outcome of the oft-repeated demand. The technical direction of the Bureau is in the hands of one of the foremost experts in architectural photography, and all the operators retained have special experience in this class of work. Particulars and illustrations of some of the Bureau's work can be obtained on application to the offices, 6, Great New Street, London, E.C.

Granite, York stone and Concrete Paving, and Glazed Bricks.

Messrs. Brookes, Ltd., of Halifax, London, and Manchester, are making a special show of the granite productions from their extensive quarries in Norway, Sweden, and Guernsey, and the samples shown are very interesting. The architectural work from "Ystehede" quarry proves clearly that the rock is of a specially fine quality, and the workmanship is not lacking in any respect. Setts and macadam specimens from Norway and Guernsey are shown, and we think, generally speaking, surveyors and engineers will find that this exhibit is worthy of special attention.

Adjoining this stand Messrs. Joseph Brooke & Sons, of Hipperholme, Halifax, are exhibiting their noted "Silex" stone, a very fine grained natural York stone, specially suitable for steps, landings, pavings, &c. This stone is quarried at a depth of 80ft. to 90ft. below the surface, and is of such a nature that it will withstand a crushing strain of over 17,000lbs. per sq. in. The stone has been used for many years by H.M. Office of Works and many leading architects, and amongst the recent works carried out may be mentioned the following: The New War Office, Local Government Offices, Admiralty Buildings, Royal College of Science, Extensions to British Museum, &c., &c., in all of which the staircases throughout have been built of this stone. The exhibit includes a few steps for a winding staircase at the British Museum, and also steps for the new Public Offices.

The Hard York Nonslip Stone Co. have a noticeable show of their "Nonslip" stone applied to both architectural and paving works. The stone is very pleasing in colour and texture, and as it is made solely from crushed "Silex" stone, its life and wear are beyond dispute. The special feature of this stone for pavements and mosaics is the fact that it never becomes slippery in wear.

In addition to these exhibits, we also had an opportunity of carefully examining specimens of glazed bricks, now being manufactured by Messrs. Brookes, Ltd., at their new Fireclay Works, near Halifax, and can only congratulate the firm on the success they have attained in these goods. We understand they have recently erected new works, replete with the very latest machinery, &c., and from which they are making a large output. They have secured several large contracts in London for these goods, and will doubtless take a position in the first rank.

Bracknell Bricks.

A good exhibit of brickwork of several kinds—including plain walling, rubbed arches, pilasters, &c.—is that of Messrs. Thomas Lawrence & Sons, of Bracknell (stand No. 46, row B). The hand-made and hand-pressed bricks of the well-known T.L.B. brand, with mottled facings in various tints ranging from a light grey to a brownish red, form a fine series. The mottled effects are produced by a special mixture of clays, and can be reproduced in any quantity. It is interesting to remind visitors that this firm executed the facing bricks for Westminster Cathedral, and some examples of similar bricks are here to be seen; these, it may be remarked, are thin, only being 2ins. thick on the face. Some red machine-made pressed bricks, suitable for facings, are shown; the brand mark in this case is * W.K.* Sand-faced tiles are also exhibited.

A Bath for Small Cottages.

The Patent Adjustable Bath Co., of 31, Broad Street, Birmingham, are showing at stand No. 56, row B, their hinged baths, which can be turned up vertically in a cupboard. A bath which does not occupy much space, and is cheap, is a most important point in the design of cheap houses for the working classes, and the "Adjustable" bath evidently fulfils this want because it has been largely adopted for many housing schemes. It has been installed at Bournville and at Handsworth, for instance. When the bath is fixed without taps no water rate should be charged. The water is easily obtained from a tap over the sink by a pail, and the hot water from the ordinary kitchen range. A geyser can, however, be fitted if desired.

An Ingenious Wood-Working Machine.

Last week we gave an illustration of the "One-and-All" wood-working machine, shown by Messrs. Bastin & Co., of 37, Queen Victoria Street, at their stand in wall space No. 158. This is an attachment for vertical spindle machines. It is cheap and efficient. It has a universal swivel cutter spindle, capable of producing every kind of moulding work. This machine will trench stair strings, &c., cleanly and rapidly. It has various attachments for stop-chamfering, dovetailing, &c.

Reconstructed Limestone.

At special position No. 19 an elaborate stand has been built up with various stones—chiefly Hopton Wood—inlaid with marbles, by the Lithographic Stone and Marble Co., Ltd., of 11 and 12, Finsbury Square, E.C. The artificial stones and marbles shown are obtained by a patent reconstruction process, and, in addition to uniform density and great resistance to crushing or breaking, a reduction of 50 per cent. in cost is claimed for them. The process, briefly, consists in the decomposition of limestone by heat, the collection of the carbonic acid gas, driven off, the making of blocks from the slaked residue by great pressure, and then the re-carbonating by the application of the carbonic acid originally collected. The artificial stone thus obtained can be made from quarry-waste, and is much harder and has more uniform quality than the original stone. The imitations of marble produced from slag and other materials are indeed wonderful. The company should have a prosperous future before it.

Frazzi Floors and Partitions.

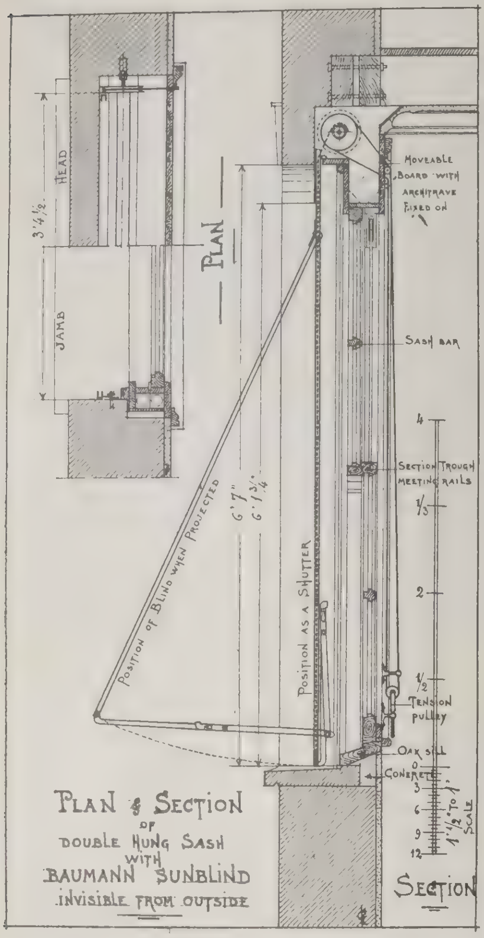
We followed our notice last week of Frazzi construction, exhibited at stand No. 48, row B, with a notice of some terracotta armoured wire netting, which we referred to as Frazzi material. The mistake arose from the fact that the exhibitor in the gallery is the London agent for Frazzi fireproofing materials. The lathing does not, however, come from the same source.

Calmon's Asbestos Sheets.

Calmon's asbestos sheets, slates, &c., are shown at one of the stands in the hall, although the firm have not a separate exhibit.

Varnishes and Paints.

The stand of the Colne River Varnish and Enamel Co., No. 3a, row B, in the gallery, is tastefully arranged. A number of paints, varnishes, &c., are well displayed. These manufactures are of specially good quality, and very reasonable in price. Pavilion No. 126, row G, has been painted with "Dialene."


HEAD
3' 4½.
JAMB
PLAN
MOVEABLE BOARD WITH ARCHITRAVE FIXED ON
SASH BAR
SECTION TROUGH MEETING RAILS
POSITION OF BLIND WHEN PROJECTED
POSITION AS A SHUTTER
6' 7"
6' 1¾"
4
⅓
2
½
TENSION PULLEY
OAK SILL
CONCRETE
0
3
6
9
12
1½" TO 1' SCALE
PLAN & SECTION OF DOUBLE HUNG SASH WITH BAUMANN SUNBLIND INVISIBLE FROM OUTSIDE
SECTION

Baumann Blinds.

In the annexe Mr. W. Baumann exhibits his well-known sun blinds. These are formed of slats on a galvanised steel band, which roll up. The slats remain a certain distance apart, so as to afford ventilation and yet prevent anyone seeing through them from the outside. They can work vertically or projected from the window at an incline, as shown above. Another variety of this blind is a band composed of slotted steel plates. The slots allow the blind to be pulled open, so as to allow ventilation, or it may be closed by lowering. The Baumann blinds and roll shutters are the best of the ingenious types of fitments found in French buildings. They are being extensively adopted in this country, and everyone should make a point of seeing this exhibit. The illustration which we give shows the way in which Baumann blinds have been fitted in particular circumstances for several architects.

Imitation Marble Glass Tiles.

Messrs. Joseph Causton & Sons, Ltd., of Birkbeck Street Works, London, E., exhibit at bay 16 in the main hall examples of their patent "Marblo" tiles and panels, which are an imitation of real marble in vitrified colours on opal glass sheets. There are a number of other specialities shown, such as mirrors, ornamental sheets of plate glass, leaded lights, shop facias, and stall-boards.

"Clipper" Specialities.

A number of specialities are shown at stand No. 144, row H, by the "Clipper" Belt Hook Co., of 251, Deansgate, Manchester. The exhibits include an improved wall-tie, an easily-fixed gate hanger, the "Clipper" belt-lacing tool and hooks, "Clipper" girder clips for electrical tubing, the "Clipper" plank clamp, and several other useful devices.

Hard Woods.

Seasoned hardwoods of many kinds are shown at bay No. 20 by Messrs. C. B. N. Snewin & Sons, Ltd., of Hatton Garden, E.C., who also exhibit a patent draught- and panic-proof door.

Compoboard.

This material—the original Swedish make—is shown at bay No. 7 by Messrs. Machin & Koenig, of 17 and 18, Roscoe Street, E.C., who also exhibit veneered panels in oak, mahogany and other woods.

Air-brush Work.

The execution of decorative work with the air-brush is illustrated at stand No. 132, row G, by the Aerograph Co., Ltd., of 43, Holborn Viaduct. Hand-pieces for working with oil and distemper paints are exhibited as well as a variety of instruments for lime washing, while the back of the stand shows the possibilities of the air-brush for friezes and wall-paper decorations.

Corkstone Insulation.

This is shown at stand No. 135, row H, by Messrs. Chittenden & Co., of 110, Fenchurch Street, E.C., one variety, "Emulgit," being specially intended for lining attics, iron buildings, &c., being a non-conductor and a sound-deadener, while another variety, "Reform," is adapted for cold-storage, ice cellars, &c., as well as for damp-proofing.

Sewage Disposal.

Mr. William E. Farrer, of Cambridge Street, Birmingham, whose stand is No. 5, row B, in the gallery, shows his improved automatic sewage distributor, specially designed for small installations, together with specimens of crushed vitrified stoneware for bacteria beds, and the Newham patent interlocking false floor tiles for forming floors in bacterial filter beds. Special designs for disc valves, manhole covers and frames, &c., as well as a large selection of other sanitary appliances are also shown.

Cowls and Ventilators.

Several patent cowls and ventilators—the "King" in particular—are shown at stand No. 146, row H, by Mr. E. G. Wright, of Guildford. Much attention has latterly been given to the subject of ventilation, and in this connection Mr. Wright's exhibit is interesting.

"Callendrite."

This is a pure Trinidad Lake bitumen, and it is shown very effectively at stand No. 71, row C, where Messrs. G. M. Callender & Co., Ltd., of 25, Victoria Street, S.W., have constructed a lake or tank lined with this material in the form of sheeting, thus illustrating its use for reservoirs, swimming baths, etc. Over the tank is a small bridge showing the use of "Callendrite" for waterproofing.

Cloisonne Glass.

The Cloisonne Glass Co., of 40, Berner's Street, W., occupy stand No. 84, row D. Here are shown a great many examples of the firm's glass adapted to varied purposes, not only for windows, but also for lamps, table tops, trays, etc.

A Combined Firegrate.

The "Venetian" fire-grate is shown at wall space No. 165 by Mr. James D. Prior, of Holliday Street, Birmingham. This has a series of bars or slots across the grate, with draught doors below, which can be altered to suit any desired fire, a more or less fast fire being possible according to the air-draught arranged. In conjunction with it is a "heat distributor," consisting of a set of strong copper tubes fitting against the back of the grate and connected with water pipes to radiators in other rooms: a system of heating being thus effected through the stitting-room fireplace. Hot-water can be supplied in the same way.

Ripolin.

We give below a view of the stand of Ripolin, Ltd., at Special Position No. 6, row G, of which we published particulars in our issue for last week.

THE EXHIBIT OF MESSRS. RIPOLIN, LTD,

THE EXHIBIT OF THE RUBEROID CO., LTD.

Sheet Roofing and Insulating Papers.

Above we give a view of the interesting stand of the Ruberoid Co., Ltd., to which we referred last week. This shows the use of "Ruberoid" for flat roofs (either boarded or concrete), and the "P & B" insulating papers, &c.

"Velography."

An exhibit of much interest is that of Messrs. Norton and Gregory, of Castle Lane, Buckingham Gate, S.W., who show at their stand in the gallery a number of specimens of "Velography," which is a process for producing duplicates of tracings and drawings. The copies given by this process are in every way excellent. They are absolutely correct, whether on drawing paper or on tracing paper or linen, and can thus be scaled off like the originals, and used for "quantities," or other work for which exactness is a necessity; moreover, they are quite permanent, while, as to cost, a single copy taken by "Velography" is no more expensive than an ordinary sunprint, and when a large number of copies are required from the same tracing the cost works out actually less than "blue" prints; this process, therefore, is a very cheap one indeed. Besides the specimens of work done by "Velography," Messrs. Norton and Gregory exhibit their "Arcus" sun-printing frame, which has a bent plate glass, with canvas cover stretched over it to any desired tension; the frame being light in weight, simple, and giving excellent contact. Another exhibit is the "Perfect" drawing table, which can be adjusted to any height or angle, and is fitted with a patent T-square which leaves the draughtsman's hands entirely free. Drawing and surveying instruments are also shown, as well as the "New Idea" spring hinge for two-way spring doors. Another novelty is a holder for tracing cloth, tracing paper, &c. This "Carriancut" holder consists of a V-shaped wooden trough fixed to the wall by means of a bracket, the front face being provided with a steel edge and zinc apron. The paper or cloth is simply placed in the trough with the free end projecting over the steel edge. When a length is required sufficient is pulled out and detached by means of a downward pressure against the steel edge. The zinc apron is used when the whole width is not required, in which case the cross cut is only made as far as necessary, a knife then being used on the zinc surface to make the cut at right angles.

Sewage Disposal Fittings.

Messrs. George Jennings, Ltd., of Lambeth, show at stand No. 29a, row B, in the gallery, their patent automatic revolving and travelling distributors for sewage beds, as well as their patent gauging apparatus, which indicates the rate of flow in gallons per sq. yd. per 24 hours. Models of domestic filters for sewage, and sewer-flushing syphons, &c., are also shown.

A Combined Brick-Moulding Machine and Pug-Mill.

This is shown at bay No. 9 by Mr. P. Bawden, of 5, Cedar Road, Tottenham, N. It is suitable for any clay that can be made into bricks by hand-moulding, and is worked by either horse or steam power.

A New Form of Leaded Lights.

Messrs. Cakebread, Robey & Co., of 86, High Street, Stoke Newington, N., occupy bay No. 17. Here, in addition to a large variety of kitchen ranges, stoves, baths, door furniture, &c., there are shown some coppered and brassed leaded lights. These are produced by a process in use by the Metallic Mirrors, Ltd. These lights have a very brilliant appearance, and the metal deposit on the lead is of such thickness as to withstand the wear of periodical cleaning, thus being far superior to the ordinary chemical deposits which are frequently used in the protection of similar work in order to get an ornamental effect. Architects will doubtless be interested to see these leaded lights. Another exhibit at the stand is the "Cat's-eye" window glass, this being formed with rows of "eyes" which give the glass an unusual brilliancy. Specimens of the "Maximum light" window glass are also shown. The distinctive feature of this well-known form of refracting glass is the lenses on what is ordinarily the plain face of the sheet. These lenses serve to spread the light that is refracted by the prisms at the back; thus light is not directed horizontally only, which would cause shadows, but is diffused in the same way as ordinary daylight.

The "Rolamat."

At the stand of the Columbian Fireproofing Co., Ltd., special position No. 9, in addition to the interesting exhibit of the Columbian system of reinforced concrete, examples are on view of the "Rolamat" steel mat. This is a mat made of crimped flat galvanised steel in strips $\frac{3}{8}$in. deep by $\frac{1}{16}$in. thick, hinged together with galvanised steel rods. This metal scraper mat can be rolled up like a piece of carpet, and does not curl up at the corners. It is extremely neat, is not liable to rust, and is a sanitary acquisition. "Rolamats" are used in a great many important buildings, and by several of the railway companies. These mats are made by Messrs. Roll-up Metal Matting, Ltd., Narford Road, Clapton, N.E.

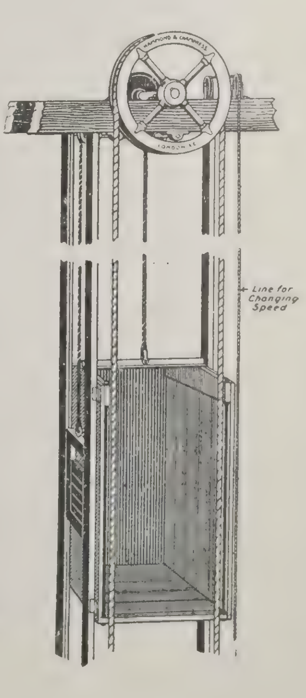
Glazed Bricks.

The Pioneer Glazed Brick Co. at stand 58, row B, have an excellent display of their white and coloured glazed bricks. A feature of this company is their "Improved Salt Glazed" bricks, which, whilst having an exceedingly hard face, are rich and even in colour, and are made in three shades—light, medium and dark. Messrs. P. C. Gross and W. P. Corby—for many years with the Leeds Fireclay Co.—are now agents for the "Pioneer" bricks, as also for Mr. Mark Gentry's red facing bricks, a pleasing display of which is shown at the same stand. Their London offices are at 11 and 12, Finsbury Square, E.C.

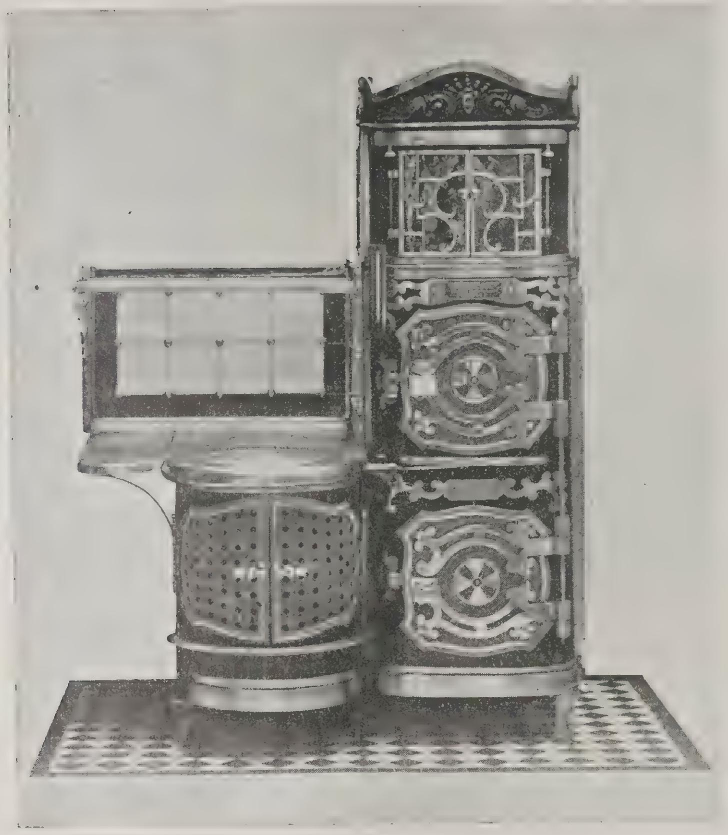
Two Sanitary Novelties.

Messrs. Burn Brothers, of 3, Blackfriars Road, S.W., exhibit at stands Nos. 38 and 39 in the gallery a number of their drainage fittings, particularly those in cast iron. These are of L.C.C. pattern, and do not need any special description here. Two novelties are shown—namely, Turner's ball lever regulator, and a new locking joint for drain-cleaning rods. In the former the lever is jointed, the outer arm with the ball float being lowered or raised by means of a screw. With this apparatus it is not necessary to bend the ball lever. It is a considerable improvement on the customary manner of adjusting the ball valve. As regards the latter novelty, this joint consists of a right and left screw thread, a socket travelling on the two butted ends of the rods. This is very superior to the ordinary device of a clip.

A Two-Speed Lift.



The accompanying figure shows the two-speed goods lift made by Messrs. Hammond and Champness, of Alfreton Street, S.E., to which we referred last week. It can be seen at stand No. 122, row G. Having two-speed gear, the lift can be sent up with its load at a slow safe speed, and then, by throwing in the other gear, it can be returned empty at a quick rate.



THE "HUBBARD" KITCHEN RANGE, EXHIBITED BY THE LONDON WARMING AND VENTILATING CO., LTD.

Stoves, Grates, &c.

The London Warming and Ventilating Co., Ltd., of 20, Newman Street, Oxford Street, W., show at wall space No. 173 their "Senior" fire and "Florence" grate, which came out first in the tests conducted at the new Government offices in Whitehall some time ago. The "Florence" grate is fitted with automatic shaking fire-bars and combination canopy regulator, and is a very effective arrangement. In the "Senior" fire a novelty is shown in providing a boiler in the secondary flue that is brought into action when the canopy is pushed in, thus enclosing the ordinary flue. By this arrangement a supply of hot water for domestic use or the heating of radiators in the bedrooms can be obtained from the ordinary grates. This is a great economy. It is undoubtedly a source of ill-health to go from a hot living room to a cold bedroom, as is customary in English houses in the winter. This firm is also showing at their stand Messrs. Robert Roy & Co.'s improved "Hubbard" kitchen range. This is entirely self-setting, requires no brick flues, has a smokeless fire, and economises fuel, while another great point in its favour is the fact that there is very little smell of the cooking in a house with such a range. The principle of its construction consists in introducing a continuous circulation of hot fresh air into the oven while cooking; that is to say, the air which passes through the front of the grate is partly utilised to burn the fuel, and partly passes round the fire, and is thus warmed before it passes into the oven. Furthermore, it can be used for roasting, the lower oven receiving radiant heat from the side of the fire. The meat is thereby roasted in fresh heated air without the attendant odours pervading the house.

Strong-room Doors.

Those visitors who are interested in fire-and-burglar-proof strong-room doors and safes should see the exhibits of Messrs. Phillips & Son, of Birmingham, at stand No. 69, row C. Here also are shown party-wall doors in accordance with the insurance companies' requirements.

Cork Asphalt.

This asphalt, which is a compound of bitumen, cork, and other materials, is shown at stand No. 24, row B, in the gallery, by Messrs Cork Asphalt Co., Ltd., of 25, Victoria Street, Westminster. It is claimed that no other pavement has such valuable qualities, as it is comparatively noiseless, non-slipping, durable, non-absorbent, and elastic. It is made in the form of blocks of uniform size.

"Ajax" Basins and Sinks.

The basins and sinks which are exhibited at stands Nos. 198 and 199, row N, annexe, by the Ajax Sanitary Co., Ltd., of 49, Stamford Hill, N., are neat in appearance and well finished, but the special feature about them is the very ingenious arrangement of the waste and overflow passage, which is covered by a nickel-plated shutter or sliding valve. This shutter is very easily operated, and allows the water to run away rapidly without noise.

A Novelty in Wallpapers.

The Grooved Wallpaper Co., of 230, Pentonville Road, King's Cross, N., exhibit a novelty in wallpapers. This consists in nearly cutting through the paper at the join, so that the edge can be torn off; thus no scissors, knife or machines are required for trimming; and in addition to this saving of time in trimming there is no smudging of the design in pasting, and a good butt join can be made.

Self-Opening Doors.

Messrs. Pemberton, Arber & Co., of Gray's Inn Passage, Holborn, are showing in the annexe a pair of Carey's "Sesame" doors. As the name implies, these doors open automatically when anyone approaches them from either side, and close when they have passed through. The mechanism is of a very simple character, consisting of a wooden platform that carries the door mats. This platform is carried at each corner by a lever, which is depressed when the weight of a person is on the mat. Connecting rods from these levers to a pin fixed on the door pivots transmit motion to the doors. The doors are so constructed that they do not swing in the face of the person, no matter which direction they approach.

Paints and Enamels.

Below we give a view of one side of Messrs. Pinchin, Johnson & Co.'s stand at Special Position No. 7, row A. This side illustrates the "Minerva" paints, while the other side shows a staircase finished with "Satinette" enamel, &c. We referred at length to these exhibits last week.

THE EXHIBIT OF "MINERVA" PAINT BY MESSRS. PINCHIN, JOHNSON & CO.

THE TIMBER TRADE.

London Market in March.

March was quiet for wood markets generally, but especially for London. The deliveries from the docks were some 1,300 standards less than in March, 1906, and overside deliveries have only reduced this shrinkage by 300 standards. For the first quarter, therefore, we are still on the downward grade in London, as the figures show a falling off of some 900 standards in all. This is by no means satisfactory, seeing that the comparison is made with a year of very disappointing demand. Messrs. Churchill and Sim observe that the present situation seems to be brought about by the conditions governing all trades at the moment, and is particularly attributable to the dearness of money, which checks building enterprise, and postpones the giving-out of contracts by public authorities, who, in ordinary times, can borrow money at cheap rates for their improvements. Prices have scarcely moved from the February rates, but here and there some weakness was shown, which demonstrated the unwillingness of buyers to average down the cost of their stocks, even preferring to see bargains pass them in the present state of the demand, rather than add to the quantity they hold. Swedish and Russian shippers have made comparatively little progress, but are still holding for full prices, the only concessions made being in whitewood, which has not quite maintained its earlier value on account of the low prices of supplies from Riga, and the large shipments of spruce from the lower ports.

Messrs. Denny, Mott & Dickson's report for March is as follows :—"Business showed considerable freedom and breadth in many directions, notwithstanding the abnormal condition of money, which tends to nervousness where large purchases of goods near at hand are concerned. The long-hoped-for recovery in the building trade is gravely checked by dear money, as new building operations require the re-establishment of that financial fostering which only comes from investors when they cannot get good interest from readily marketable securities."

The abstract of dock-stock, consumption, &c., for March, published by Messrs. Foy, Morgan & Co., is given in the table at the foot of this page.

Dock Stock.

The stock of wood in the public docks on March 31st was :—

	Pieces.
Foreign deals and ends - - -	1,629,000
Do. battens - - - -	2,767,000
Pine deals and battens - - -	608,000
Spruce do. do. - - -	876,000
Boards, rough - - - -	3,593,000
Do. prepared - - -	5,871,000

totalling 15,344,000 pieces, as against 12,417,000 in 1906, 15,361,000 in 1905, and 17,706,000 in 1904.

In other kinds the stock was as follows :—

Foreign wainscot logs - -	201 pieces.
Do. oak timber - -	857 loads.
Do. fir timber - -	1,796 do.
Do. Oregon pine, &c., spars and masts - -	2,657 do.
Colonial oak timber - -	350 do.
Colonial birch timber and planks	5,880 loads.
Do. elm and ash timber -	757 do.
Do. yellow pine - -	734 do.
United States pitch-pine timber	14,933 do.
Do. do. deals -	44,000 pieces
East India teak - - -	6,599 loads.

Deliveries.

The deliveries have been :—

	1st. 3 m'ths. Pieces.	March. Pieces.
Foreign deals and ends -	879,000	301,000
Do. battens - -	1.309,000	502,000
Pine deals and battens -	197,000	62,000
Spruce do. do. -	319,000	116,000
Boards, rough - -	1,361,000	452,000
Do. prepared - -	3,092,000	1,111,000
Total - -	7,157,006	2,544,000

The deliveries direct from ship to craft were :—

	1st 3 m'ths. P.s.h.	March. P.s.h.
Deals and battens - -	8,629	2,471
Boards - - -	2,391	1,249
Total -	11,020	3,720

Soft Woods.

Swedish Deals, Battens and Boards.—Prices did not improve during the month except for floorings, which have shown a stronger tendency, as it is realised that stock cannot be replaced, except at considerably higher levels of prices. There has been a pause in the f.o.b. selling, and buyers have been moving very cautiously, as is usual when prices are high and margins of profits small. Deals remain difficult to dispose of, and the demand from the Cape has been checked by buyers' hesitation to operate in view of political developments in South Africa. With the more settled conditions a welcome change should eventually show itself, but here again the dearness of money seems to be hindering the development of the country.

Norwegian Boards.—Norway again sent us a very small supp'y of flooring, and prices for some sizes slightly improved during the month. The shipments for the first quarter are only about half of the quantity sent here in 1906, but in the present state of the demand this is hardly noticed.

Russian Deals.—White Sea deals of good quality and in good condition have been selling fairly well, and the demand seems to have been running on them more freely, so that prices have been kept quite firm, with even a little improvement occasionally. Free-on-board business has been in much smaller compass, and shippers, by adopting a moderate range of prices early in the season, have quitted the greater part of their summer shipments, and are content to abstain from pressing buyers at present.

Finnish Battens.—There is no change to record in the value of Finnish battens in March. Very little progress was possible during the month with stocks for arrival, but this is natural after the heavy selling of the two previous months.

Prussian Timber.—No importation is to be recorded for March with the exception of a few sleepers. Prices for fir timber are unchanged, and the demand for oak has not at present revived. A fair demand for balk has resulted in a few transactions of a retail character.

Canadian Timber.—A few parcels of pine deals were sold at auction during the month at somewhat disappointing prices, considering the very high cost of fresh supplies. Spruce has been sold freely at low prices; the importation has been large, and has had an adverse effect on values of landed stock. Prices dipped considerably under some heavy selling, but here again the cost of new supplies is very high, and the market should right itself in the future unless Russian shipments are heavier than expected. There is no change to report in the position of hardwoods or yellow pine. The market for sawn timber has been steady, with a tendency to weakness only where wood of indifferent quality has been put upon the market. The demand for timber of specially long dimensions has shown a welcome improvement, and the prices are somewhat stronger.

Hard Woods.

Teak.—Messrs. Denny, Mott & Dickson report that the landings in the docks in London during March consisted of 344 loads of logs and 207 loads of planks and scantlings, or a total of 551 loads, as against 482 loads for the corresponding month of last year. The deliveries into consumption were 343 loads of logs and 415 loads of planks and scantlings—together 758 loads, against 985 loads for March, 1906. The moderate deliveries for the month exceeded the importations by over 200 loads. Of the total stock of 6,602 loads in the docks of teak of all descriptions, no fewer than 3,009 loads (or nearly 46 per cent.) is Java wood, a great deal of which is of quality and sizes quite unsuited to this market. Some hundreds of loads of this description were sold by auction during the month at prices which must inevitably inflict a severe loss on the shippers. Because the better-known Burmah and Siam teak is now unprecedentedly high in cost, it has been thought good business to rush over from Java wood which, quite irrespective of the justifiable preference for the teak from Burmah and Siam, has been shipped without any right care in respect to quality or endeavour to suit the requirements of consumers here as to specification. The real difficulty of getting good lengths in the Java production may be insurmountable, but the first-class shippers have for years past shown consistently that *good merchantable* wood, with the freedom from excessive defects implied in such description, can be shipped in sufficient quantity to meet all shortage in the supplies to Europe from other producing countries; and it has been a very suicidal policy for those having an interest in the Java production to add to the natural prejudice of consumers by shipping large quantities of Java logs of an unnecessarily bad quality.

Mahogany.—This market has been firm, but the bare stocks have prevented any very active business. Modest floating supplies of Tobasco and Belize wood are near at hand, and will be very welcome.

Abstract of Stock, Consumption, &c., in London Docks, for March.

All Docks.	Deals (Fir).	Battens (Fir).	Pine.	Spruce.	Pitch-pine Deals.	Deals and Battens in Aggregate.	Rough Boards (All Countries).	Flooring.	Floated Timber.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Loads.
1907. Public dock stock -	1,381,199	2,970,619	608.506	876,697	44,360	5,881,381	3,593,328	5,870,516	21,000
Monthly public dock consumption - - - -	245,584	535,189	59,902	117,522	10,935	969,132	453,243	1,113,121	3,683
Overside stock - - -	194,011	422,799	47,323	92,842	—	756,975	358,062	155,837	—
Overside consumption (estimated of dock) :— 111 per cent. Sawn, 60 " Planed	272,598	594,060	96,491	130,449	—	1,063,598	503,100	667,873	—
Duration of supply at same rate of consumption - -	3·04 months.	3·01 months.	5·19 months.	3·91 months.	4·06 months	3·27 months.	4·13 months.	8·38 months.	5·70 months.

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Bangor (Co. Down).—For the erection of a manse on the Maxwell Road, for the Committee of the First Bangor Presbyterian Church. Mr. Ernest L. Woods, architect, Bangor :—

H. Keith, Belfast	£1,740	0	0
R. Colwell, Belfast	1,690	0	0
E. Beers, Belfast	1,512	10	0
L. Irving, Bangor	1,448	0	0
Colville & Watson, Bangor	1,390	0	0
T. McKie,* Belfast	1,200	0	0

* Accepted.

Brighton.—For the erection of a detached house in Dyke Road, for W. F. Knight, Esq. Messrs. Overton & Scott, architects and surveyors, 22, Ship Street, Brighton, and Public Hall, Uckfield :—

Packham, Sons & Palmer, Brighton	£1,405
W. Brown & Sons, Brighton	1,390
H. J. Penfold, Brighton	1,347
A. E. Lewer, Brighton	1,200
Simmonds Brothers, Brighton	1,198
G. P. Kerridge, Brighton	1,175
A. Chilton, Uckfield	1,139
A. Cruttenden,* Brighton	1,025

* Accepted.

Grimsby.—For the erection of proposed new works at South Killingholme, for the Grimsby Fish, Manure & Oil Co. Messrs. Bentley & Hall, architects, 1, Pelham Chambers, Old Market Place, Grimsby :—

W. Pattinson & Sons, Westminster	£5,973	0	0
Hewins & Goodhand, Grimsby	5,897	0	0
W. Moss & Sons, Loughborough	5,836	16	8
H. Marrows, Grimsby	5,765	0	0
Quibell, Son & Greenwood, Hull	5,707	0	0
J. H. Thompson & Sons,* Grimsby	5,600	0	0
H. W. Parker & Son, Boston	5,430	10	0

* Accepted.

Hull.—For the construction of foundations and basement to proposed shops on south side of Jameson Street, for the Corporation. Mr. Joseph H. Hirst, city architect, Town Hall, Hull :—

J. Sangwin	£1,604	0	0
J. Brunton	1,554	6	9
G. Houlton & Son	1,260	0	0
T. Goates	1,256	18	0
J. H. Fenwick	1,244	0	0
M. Harper	1,231	10	0
J. T. Levitt	1,211	0	0
Quibell, Son & Greenwood	1,196	0	0
G. H. Panton*	1,118	0	0

* Accepted.
All of Hull.

Kirkburton (Yorks).—For the construction of about 8,523 lin. yds. of stoneware pipe sewers, and about 506 lin. yds. of iron pipe sewers, together with manholes, &c., for the Kirkburton U.D.C. Messrs. Brook, Dransfield & Dyson, engineers, Estate Buildings, Huddersfield :—

R. C. Brebner, Edinburgh	£8,922	17	7
W. Underwood, Dukinfield	8,020	9	7
J. H. Macdonald, Oxford	7,886	0	0
J. F. Tyler, Oswestry	7,387	0	0
Kelletts, Ltd., London	7,329	17	11
S. Johnson & Son, Salford	6,827	11	6
H. Smith, Halifax	6,706	0	0
M. Arundel, Wakefield	6,640	4	8
A. Braithwaite & Co., Leeds	6,553	0	3
Etheridge & Clarke, Manchester	6,5[illegible]7	5	7
R. Turner, Holmfirth	6,423	10	2
R. Naylor & Sons, Bradford	6,297	17	11
Eagland & Sons, Huddersfield	6,288	0	0
Edmondson & Wyatt, Oldham	6,270	0	0
J. Bentley, Bradford	6,183	13	5
W. Dolman, Dewsbury	6,115	6	4
H. H. Barry, Nottingham	6,022	0	0
Ward & Tetley, Bradford	5,968	3	5
Sidebottom & Brown, Cleckheaton	5,791	6	7
J. Balmforth, Elland	5,721	8	2
G. H. & N. W. Graham, Huddersfield	5,644	0	0
S. Graham, Huddersfield	5,606	0	0
Bentley & Swift, Huddersfield	5,577	13	5
W. Waring & Sons,* Huddersfield	5,565	0	0

* Accepted.
Engineers' estimate, £5,826 11s. 7d.

Sevenoaks.—Accepted for the erection of a new house, The Drive, for Mr. R. Barrat. Mr. Jabez Mann, M.I.C.E., architect and surveyor :—

W. Wilkline & Sons	£1,188

Ton Pentre (Rhondda Valley).—Accepted for making certain alterations and additions to vestry of Jerusalem Welsh Calvinistic Methodist Chapel, for the Trustees. Mr. W. D. Morgan, M.S.A., architect, Post-office Chambers, Pentre :—

Morgan Brothers, Ton Pentre	£1,135

Uckfield.—For alterations and additions to the Public Hall. Messrs. Overton & Scott, architects and surveyors, Public Hall, Uckfield, and 22, Ship Street, Brighton :—

W. Brown & Sons, Brighton	£765	0	0
Saunders Brothers, Brighton	755	0	0
B. Farrant, Uckfield	739	0	0
A. Chilton, Uckfield	719	0	0
C. Pelham, Uckfield	706	10	0
H. J. Smith & Sons,* Maidstone	612	0	0

* Accepted.

Current Market Prices.

METALS.		£	s.	d.	£	s.	d.
Standard Copper	per ton	95	0	0	96	0	0
Do. Strong sheets	do.	118	0	0	119	0	0
Lead, soft foreign	do.	19	10	0	19	12	6
Do. English	do.	19	15	0	19	17	6
Do. pipes	do.	22	10	0	22	15	0
Do. sheets	do.	22	0	0	22	5	0
Galvanised Corrugated sheets	do.	13	12	6	13	15	0
Spelter G. M.	do.	25	17	6	26	0	0
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	7	17	6	8	0	0
Marked bars, Staffs.	do.	9	0	0	9	2	6
Common bars, do.	do.	7	5	0	7	10	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	17	6	7	0	0
Angles, Midlands	do.	7	0	0	7	5	0
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	181	0	0	182	0	0
Do. English ingots	do.	185	0	0	186	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

Deals, Archangel, Yellow, 2nd, 3×11	per std.	14	5	0	—		
Do. do. do. do. 3×9	do.	14	10	0	—		
Do. do. do. 3rd, 3×8	do.	9	15	0	10	0	0
Do. do. do. do. 3×9	do.	11	10	0	—		
Do. do. do. 4th, 3×9	do.	9	10	0	—		
Do. do. White, 2nd, 3×11	do.	13	0	0	—		
Do. do. do. do. 3×9	do.	9	15	0	—		
Do. Batskarsnas, Yellow, 3rd, 3×9	do.	10	0	0	—		
Do. do. do. unsorted, 4×8	do.	9	5	0	9	10	0
Do. Bjorknas, Yellow, 4th, 3×9	do.	10	5	0	—		
Do. do. do. 5th, 3×9	do.	9	15	0	—		
Do. Fredrikshamn, Yellow, 1st & 2nd, 3×5	do.	8	0	0	—		
Do. Kovda, Yel'ow, 2nd, 3×7	do.	12	5	0	—		
Do. do. do. 3rd, 3×9	do.	10	15	0	—		
Do. Lulea, Yellow, 1st, 3×9	do.	10	5	0	10	10	0
Do. Nederkalix, Yellow, 2nd, 3×5½	do.	7	15	0	—		
Do. Onega, Yellow, 3rd 3×8	do.	11	5	0	—		
Do. do. do. do. 3×7	do.	10	15	0	—		
Do. Pernoviken, Yellow, 1st & 2nd, 2½×8	do.	9	0	0	—		
Do. Quebec, Spruce, 1st, 3×9	do.	14	10	0	14	15	0
Do. do. do. 2nd, 3×9	do.	9	10	0	9	15	0
Do. Sandarne, Yellow, 4th, 3×7	do.	9	15	0	—		
Do. Skelleftea, Yellow, 3rd, 4×9	do.	9	10	0	—		
Do. do. do. 5th, 3×7	do.	8	10	0	—		
Do. Soroka, Yellow, 2nd, 3×9	do.	14	15	0	—		
Do. Sundswall, Yellow, 3rd, 3×8½	do.	8	10	0	—		
Battens, Aryd, Yellow, unsorted, 2×4½		7	15	0	8	0	0
Do. Batskarsnas, Yellow, unsorted, 2×9	do.	9	10	0	—		
Do. do. do. do. 2×5	do.	8	10	0	—		
Do. do. do. do. 2×4½	do.	8	10	0	—		
Do. Fredriksstad, Yellow, unsorted	do.	9	10	0	9	15	0
Do. Archangel, White, unsorted, 2×4	do.	7	15	0	—		
Do. Kalix, Yellow, 3rd, 2½×7	do.	0	15	0	—		
Do. Pernoviken, Yellow, 1st & 2nd, 2½×7	do.	9	10	0	—		
Do. do. do. do. 2×6	do.	8	15	0	—		
Do. do. do. do. 2×5	do.	8	5	0	—		
Do. do. do. do. 1×5	do.	8	0	0	8	5	0
Do. Skelleftea, Yellow, 1st & 3rd, 2½×6	do.	8	10	0	—		
Do. do. do. 5th, 2×5	do.	8	0	0	—		
Do. do. do. unsorted 2½×4	do.	7	10	0	—		
Do. Trangsund, 1st & 2nd, 2½×7	do.	9	10	0	9	15	0
Do. do. do. do. 2×4	do.	9	10	0	—		
Do. do. do. unsorted, 2×4	do.	9	10	0	—		
Do. do. do. do. 2×3½	do.	8	15	0	—		
Flooring Boards, Fredriksstad, Yellow, 3rd, 1×7	do.	0	10	3	—		
Do. do. do. unsorted, 1×6½	do.	0	9	6	—		
Do. do. do. do. 1×6	do.	0	9	9	—		
Do. do., Yellow and White, 1×7	do.	0	8	0	—		
Do. do. do., 1×6½	do.	0	7	9	—		
Do. do. Mixed Yellow, 1×6½	do.	0	9	6	—		
Do. Hudikswall, White, unsorted, 1¼×6½	do.	0	11	6	—		
Do. do. do. do. 1¼×6	do.	0	11	9	0	12	0
Do. do. do. do. 1¼×6	do.	0	11	6	—		
Do. Sandarne, Yellow, 1st, 1×6¼	do.	0	12	0	—		
Do. do. do. 2nd, 1×6½	do.	0	11	6	—		
Do. Skelleftea, Yellow, 2nd, 1×6	do.	0	11	6	—		
Do. Mon, Yellow, 2nd, 1×6	do.	0	11	3	—		

Bankruptcies.

During the week ending April 12th nineteen failures in the building and timber trades in England and Wales were gazetted.

C. Read, builder, Tooting. R.O., April 4.

T. Hines, builder, Caerphilly. R.O., April 3.

J. Goodenough, builder, Cowes. R.O., April 5.

J. E. Turner, builder, Walmer. R.O., April 3.

G. H. Jones, builder, Handsworth. R.O., April 5.

R. James, builder, Worthing. Liabilities, £926; assets, £392.

F. Stone, builder and contractor, Brislington. R.O., April 6.

J. F. C. Bell, architect, London. P.E., Bankruptcy Court, May 8, at 11.

A. Mann, builder, Croydon and London. P.E., Bankruptcy Court, May 10, at 12.

E. W. Crickmay, architect and surveyor, London. P.E., Bankruptcy Court, May 8, at 11. R.O., March 28.

J. Thompson, builder, Wallsend. Liabilities expected to rank for dividend, £1,352; assets, £924; deficiency, £428.

J. C. Moore, builder, Bristol. First meeting, O.R.'s, Bristol, April 17, at 12. P.E., Guildhall, Bristol, April 26, at 12. R.O., April 4.

W. D. Harrison, builder and decorator, London. First meeting, Bankruptcy Court, April 22, at 11. P.E., same, May 16, at 11. R.O., April 5.

J. T. Ruffell, builder, Hockley. First meeting, The Institute, Southend-on-Sea, April 17, at 12. P.E., Shire Hall, Chelmsford, May 1, at 10.

H. Baxter, builder and contractor, Mansfield. Gross liabilities, £2,370; £1,140 expected to rank for dividend; assets, £446; deficiency, £694.

W. & J. Bennett, builders and contractors, Montpelier and Bristol. First meeting, O.R.'s, Bristol, April 17, at 11.45. P.E., Guildhall, Bristol, May 10, at 12.

New Companies.

Alexandra Brick and Tile Co. Capital: £2,000.

Himley Fire and Red Brick Co., to acquire the business carried on by A. L. Chance, Himley, Staffordshire. Capital: £20,000.

Letchworth Cottages and Buildings, to assist in the development of the estate acquired by First Garden City, Ltd., Estate Office, Main Avenue, Letchworth. Capital: £20,000.

Coming Events.

Wednesday, April 17.

Architectural Association (Discussion Section).—Mr. A. O. Collard, F.R.I.B.A., on "Payment and Responsibilities of Architects," at 7.30 p.m.

Institution of Civil Engineers.—Students' visit to the works of the British Oxygen Co., Ltd., Elverton Street, Westminster.

Society of Architects.—Mr. Edgar C. Thrupp, A.M.I.C.E., on "Legal Hindrances to Modern Methods of Building Construction," at 8 p.m.

Edinburgh Architectural Association.—Associates' annual business meeting.

Royal Sanitary Institute.—Inspection and demonstration at the East London Soap Works, Bow, at 3 p.m.

Junior Institution of Engineers.—Visit to Cassell & Co.'s printing works, at 6.30 p.m.

Thursday, April 18.

Society of Architects.—23rd annual dinner, at De Keyser's Royal Hotel, at 7 p.m.

Institute of Sanitary Engineers.—Finance Committee at 3.30 p.m.; Organising Committee at 6.30 p.m.; President's address.

Friday, April 19.

Institute of Sanitary Engineers.—Dr. E. Abbott on "Heating and Hot-Water Supply," at 7 p.m.

Royal Sanitary Institute.—Mr. J. E. Worth on "Sewerage," at 7 p.m.

Saturday, April 20.

Edinburgh Architectural Association.—Visit to Bangour Village.

Royal Sanitary Institute.—Inspection and demonstration at Morden Hall Dairy Farm, Morden, Surrey, at 3 p.m.

Monday, April 22.

Coal Smoke Abatement Society.—Annual general meeting, Haymarket Theatre, at 3 p.m.

Royal Institute of British Architects.—Meeting at 8 p.m.

Wednesday, April 24.

Edinburgh Architectural Association.—Annual business meeting and President's valedictory address.

Royal Sanitary Institute.—Inspection and demonstration at the East London Waterworks, Lea Bridge, Clapton, at 3 p.m.

Thursday, April 25.

Institution of Mechanical Engineers.—President's address, at 8 p.m.

Friday, April 26.

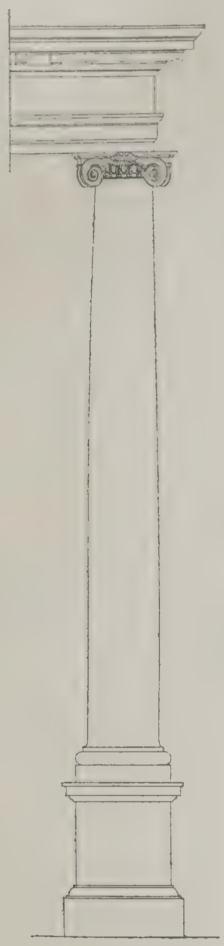
Architectural Association.—Mr. F. W. Simon, F.R.I.B.A., on "Liverpool Architecture," at 7.30 p.m.

Institute of Sanitary Engineers.—Dr. J. Priestley on "Sanitary Law," at 7 p.m.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Eleventh Series.)

CLASS A (ARCHITECTURE).



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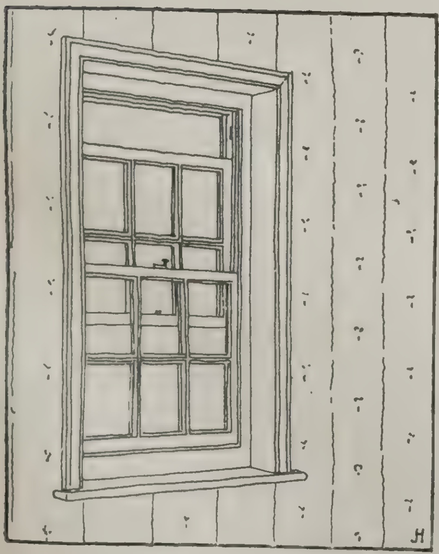

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This competition has been instituted with the object of increasing the circulation of The Builders' Journal by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building.

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of The Builders' Journal, 6, Great New Street, London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of The Builders' Journal, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

10. Any violation of these rules will entail disqualification.

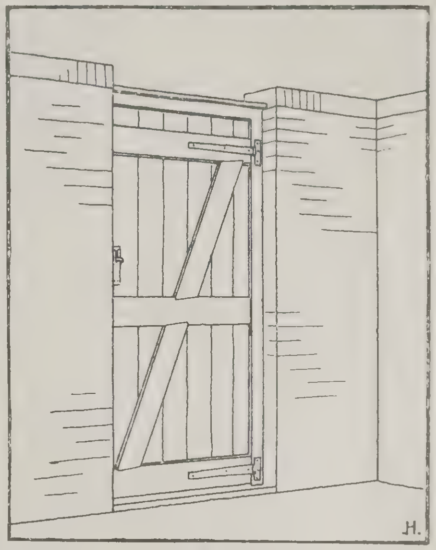
11. The Editor's decision on every matter will be final

Particulars of a new competition in connection with this "Architectural Dis-Orders" Competition will be found on p. 185 of this issue.

(For Coupons see page xxxii.)

Copies of "The Builders' Journal" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.

CLASS B (BUILDING).



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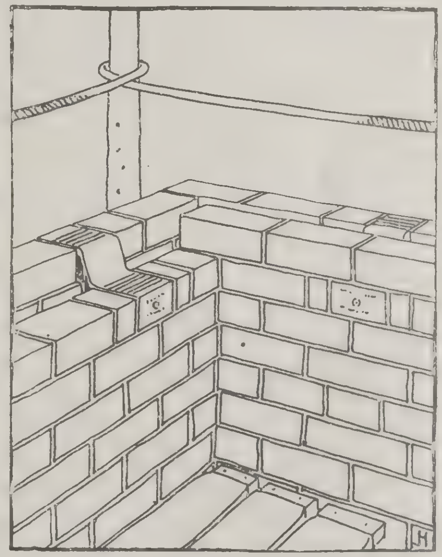

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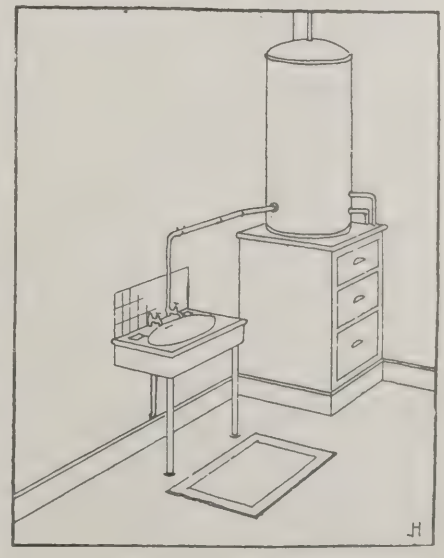


Notes and News

Ludgate Hill Station is to be practically rebuilt at a cost of £40,000.

New Showrooms. — The London Electrical Fittings Co., Ltd., notify us that they have opened new showrooms at 15, Newman Street, Oxford Street, W.

Northern Architectural Association.—The annual report, &c., for 1907 has just been issued. The present membership is given as 250, being the largest of any of the Allied Societies.

Architectural Education in Ireland.— At last week's council meeting of the Royal Institute of the Architects of Ireland it was decided to call a special council meeting to consider the education scheme drawn up by the Architectural Association of Ireland.

Selby Abbey Restoration.—At a meeting of the Executive Committee of the Selby Abbey Restoration Fund held last week the tender of Mr. Thomas S. Ullathorne, of Selby, was accepted for the flooring of the nave. The glazing of the nave windows is to be taken in hand, and the general work pushed forward so as to enable this portion of the building to be opened in October.

Sheffield Society of Architects and Surveyors.—At the annual general meeting of this society, held last week, Councillor W. C. Fenton was elected president for the ensuing year, and Mr. W. J. Hale vice-president. Messrs. A. W. S. Cross and G. Hubbard, of London, read papers on "The revision of the Charter of the Royal Institute of British Architects." A discussion followed, in which the feeling was expressed that these proposals, the result of compromise, left the main subject—*i.e.*, compulsory registration of architects, much in the same position as before, and that the supporters of this measure should not relax their efforts until their object was attained.

An Easter Visit. —During the Easter vacation a party of students drawn from the building classes at the Central, South Norwood and Thornton Heath Polytechnics visited the Black Country, under the guidance of their lecturer, Mr. J. Crewdson. On Good Friday they inspected the Earl of Dudley's iron and steel works at Brierley Hill, and on Saturday the party visited the fireclay works of Messrs. Pearson & Co. at Stourbridge (here the students were taken down the mine, which lies beneath a seam of coal), and Messrs. King & Son's terra-cotta, brick and fireclay works.

Registration of Plumbers.—The Southampton Town Council has passed a resolution in favour of action being taken by the Government either to introduce a Plumbers' Registration Bill or to support a departmental measure introduced by the Local Government Board. It has also been decided to insert in all future contracts where plumbing work is to be carried out a clause to the effect that such work shall, where possible, be performed by registered plumbers, and that the plumbing work for the Corporation shall likewise be carried out by registered plumbers.

Architects and the new Compensation Act. —At last week's meeting of the Glasgow Institute of Architects it was stated that the Council had written to the Bristol Society of Architects approving of the proposal that presidents of allied societies should ex-officio be members of the Council of the R.I.B.A. The Chairman intimated that the Royal Institute had obtained an opinion from their legal advisers on the question of the liability of architects under the Workmen's Compensation Act, 1906, in the case of accidents to clerks of works, architectural pupils, &c., but as it was not final the matter had been again referred to the solicitors.

Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

April 19. Portslade-by-Sea.—*Erection of a new police station* and police residences at Portslade-by-Sea. Persons desirous of tendering are requested to send their names and addresses to F. J. Wood, county surveyor, County Hall, Lewes, on or before April 19, from whom full particulars can be obtained.

April 19. Exeter.—*Erection of new almshouses*, remodelling existing cottages, and the restoration of the chapel at St. Annes, Exeter, for the Very Reverend the Dean and Chapter of Exeter. Builders desirous of tendering may see the plans and specifications at the offices of E. H. Harbottle & Son, architects, County Chambers, Exeter. Tenders to be submitted to them not later than April 19.

April 19. Chelsea, S.W.—*Reconstruction of the footbridge* at Chelsea Station, for the Directors of the West London Extension Railway. Plans and specification may be seen, and forms of tender and bills of quantities obtained, at the office of the Engineer at the Paddington (Great Western) Station, between 10 a.m. and 4 p.m. Tenders, addressed to E. C. Price, secretary, 57, Moorgate Street, London, E.C., and marked outside "Tender for Footbridge," will be received on or before April 19.

April 20. Bradford.—*Erection of a warehouse* in Leeds Road, Bradford. Plans and specifications may be seen and bills of quantities obtained at the offices of B. Dobson, architect, 5, Charles Street, Bradford, till April 20.

April 20. Blaenavon.—*Erection of a classroom* and other works at the Hillside Council School, Blaenavon. Plan and specification may be seen at the County Council Offices, Newport, Mon. Sealed tenders, endorsed "Tender Hillside Council School," are to be delivered to C. Dauncey, secretary, C.C. Offices, Newport, Mon., not later than April 20.

April 20. Carlisle.—*Alterations and additions* to the Dearham Council school. Persons desirous of tendering may see the drawings and specification at the office of J. Forster, clerk of works, 13, Earl Street, Carlisle. Tenders to be delivered at the office of C. C. Hodgson, secretary, The Courts, Carlisle, at or before 1 p.m. on April 20, endorsed "Tender for Alterations and Additions to Dearham Council School."

April 22. Hale.—*Erection and completion of new stables*, steam road roller shed, &c. Plans and specifications can be seen, and bills of quantities and form of tender obtained on the payment of a deposit of £1 1s., at the office of S. A. Pickering, Council's surveyor, any day during the usual office hours. Tenders and priced bills of quantities are to be sent to J. G. Whyatt, clerk to the Council, Council Office, Ashley Road, Hale, Cheshire, not later than noon of April 22, in envelopes endorsed "Tender for New Stables."

April 22. Pentre.—*Erection of minister's house* at Pentre, for the Trustees of Nazareth Calvinistic Methodist Chapel, Pentre. Plans and specification may be seen at the office of W. D. Morgan, M.S.A., architect, Post Office Chambers, Pentre, Rhondda. Sealed and endorsed tenders to be delivered to D. Meggicks, 12, Llewellyn Street, Pentre, on or before 5 p.m. on April 22.

April 22. Barnsley.—*Pulling down of the mills*, laying out the estate, and the erection and completion of 12 houses and shops, also 40 dwelling-houses on the site. Contractors desirous of tendering should send in their names to Tennant & Collins, architects and surveyors, Regent Street, Barnsley, and at Pontefract, on or before April 22.

April 22. Leeds.—*Erection of proposed house* and shop premises at the junction of Mabgate and Quarry Hill, Leeds, for J. Drewery. Contractors desirous of tendering must please forward their applications to T. Winn & Sons, architects, 84, Albion Street, Leeds, not later than April 22, when bills of quantities will be duly forwarded.

April 23. London, S.E.—*Addition to the call-over office* at the Guardians' Offices, Brook Street, Kennington, S.E., for the Guardians of the Poor of the Parish of Lambeth. Tenders, which will be received only on the printed form, must be sent by post on or before April 23, addressed to W. Thurnall, clerk, Guardians' Board Room and Offices, Brook Street, Kennington Road, S.E., and sealed and endorsed "Tender for Call-over Office," and will be opened at the Board Room at noon on the following day, when all persons tendering, or their authorised agents, must be in attendance. The drawing and draft of contract may be inspected at these offices on any day between 10 a.m. and 5 p.m. Specification and forms of tender will be supplied on personal application and on payment of £2 in respect thereof.

April 24. Cymmer.—*Erection of a new Baptist chapel* at Cymmer, near Port Talbot, for the Rev. E. K. Jones and Trustees. Plans and specifications may be seen with the Rev. E. K. Jones, 6, School Street, Cymmer, and quantities may be obtained from Evans & Jones, architects and surveyors, 4, Trinity Place, Swansea, on deposit of £2 2s. Sealed tenders, endorsed "Baptist Chapel," to be delivered to J. Jones, 3, Prosser's Terrace, Cymmer, not later than April 24.

April 23. Durham.—*Repairs to the Teacher's residence* at the West Stanley Council School. Plans, specification, and conditions of contract may be seen, and forms of tender obtained either at the school or at the Architect's office, Shire Hall, Durham. Sealed tenders, endorsed "West Stanley, Master's House—Tender," must be forwarded to A. J. Dawson, clerk to the Education Committee, Shire Hall, Durham, not later than April 23.

April 24. Ashton-under-Lyne.—(*1*) *The supply and fixing of fire escape staircases* at the Workhouse, and (2) for the structural alterations in connection therewith, for the Guardians of the Ashton-under-Lyne Union. Specifications and quantities in each case to be obtained from J. Eaton, Sons & Cantrell, architects, Stamford Street, Ashton-under-Lyne, after payment to the Clerk to the Guardians of the sum of £2 2s. Tenders, endorsed "Escapes," and sealed with wax, must be sent to G. H. Partington, clerk to the Guardians, Poor Law Offices, Ashton-under-Lyne, not later than April 24.

April 25. Ferrybridge.—*Alterations to the "Greyhound" Inn*, Ferrybridge, for the Carter's Knottingley Brewery Co., Ltd. Plans and specifications may be seen of Garside & Pennington, architects and surveyors, Pontefract and Castleford (Pontefract office). Sealed and endorsed tenders to be forwarded to them on or before April 25.

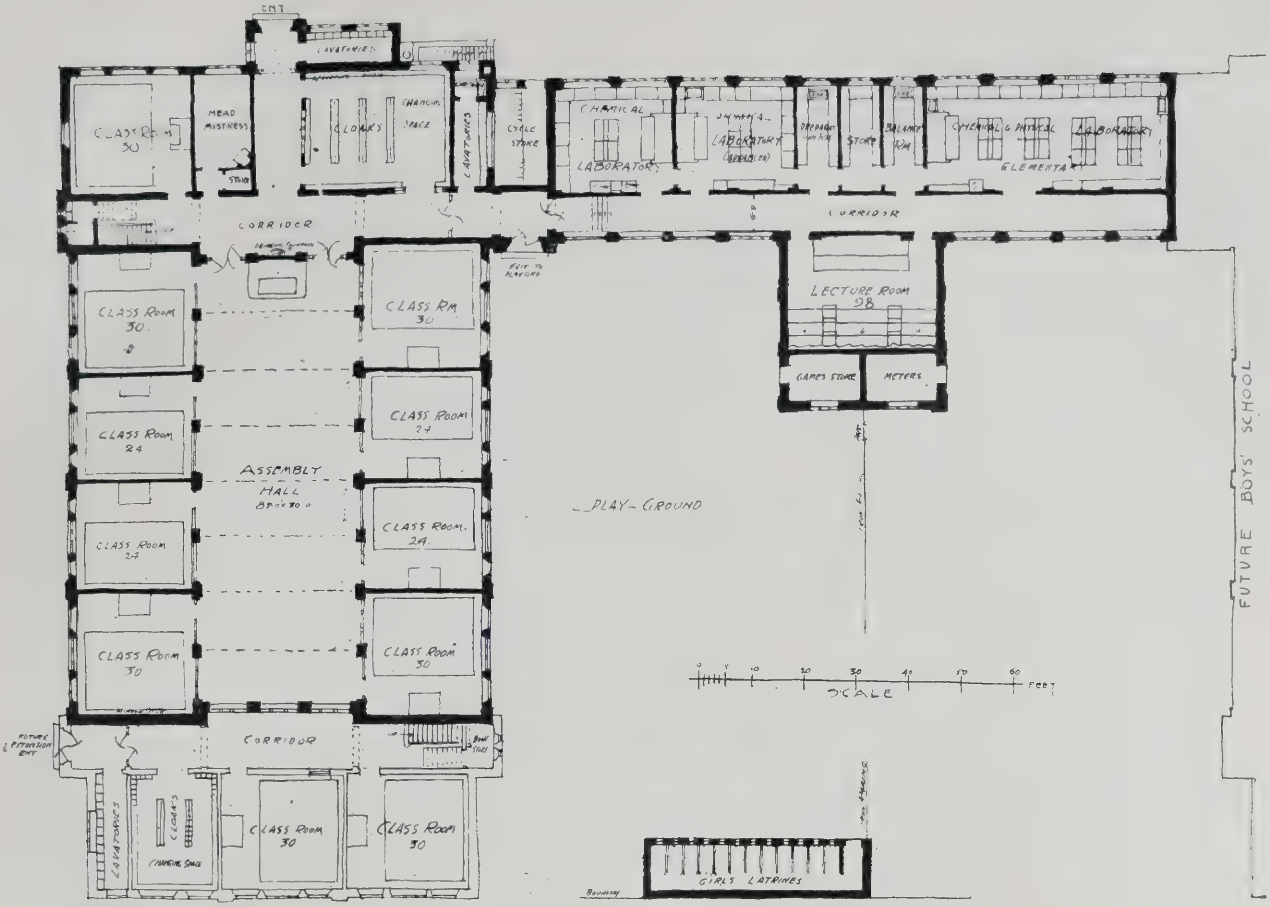
April 25. Liverpool.—*Construction of public baths* at Queen's Drive, Walton. Plans and specifications may be inspected and quantities obtained on application to W. R. Court, engineer and chief superintendent, Municipal Offices, Liverpool, on payment of £1 1s. Tenders, endorsed "Tender for Public Baths, Walton," addressed to the Town Clerk's office, must be forwarded by letter post on April 25.

April 26. Chingford.—*Erection of a new sorting office* at Chingford. Drawings, specification, and a copy of the conditions and form of contract may be seen on application to J. Wager, H.M. Office of Works. Bills of quantities and forms of tender may be obtained at the undermentioned address on payment of £1 1s. Tenders must be delivered before 12 noon on April 26, addressed to the Secretary, H.M. Office of Works, &c., Storey's Gate, London, S.W., and endorsed "Tender for Chingford new Sorting Office."

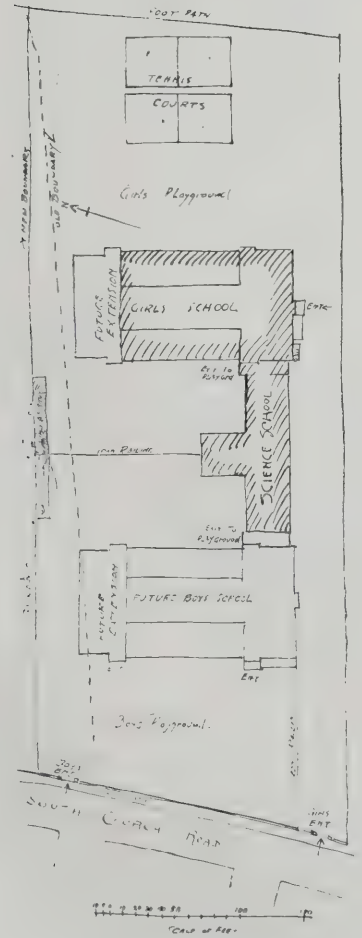
April 30. Bromley.—*Providing and fixing* about 2,226ft. super of panelling in the new Municipal Buildings in Tweedy Road, Bromley, together with the necessary Police Court furniture, &c., in accordance with the drawings and specification prepared by R. F. Atkinson, F.R.I.B.A., of 8, Sackville Street, W., which may be seen at his office, where forms of tender can also be obtained. Tenders, endorsed "Panelling," to be delivered to F. H. Norman, town clerk, Bromley, Kent, not later than 3 p.m. on April 30.

April 30. Yatton.—Contract No. 3: *Erection of a pumping station* and caretaker's cottage in connection with the new water supply for the Parish of Yatton, in accordance with plans and specifications prepared by the Engineer, A. P. I. Cotterell, M.Inst.C.E., of 28, Baldwin Street, Bristol. The plans may be seen at his offices during usual office hours. Copies of the specification, forms of tender, and bill of quantities may be obtained from the Engineer by intending contractors on payment of the sum of £2 2s. Tenders on the forms provided must be delivered to A. E. Hicks, clerk, Union Offices, Flax Bourton, near Bristol, under seal, and endorsed "Tender for Yatton Water Supply, Contract 3," at or before 10 a.m. on April 30.

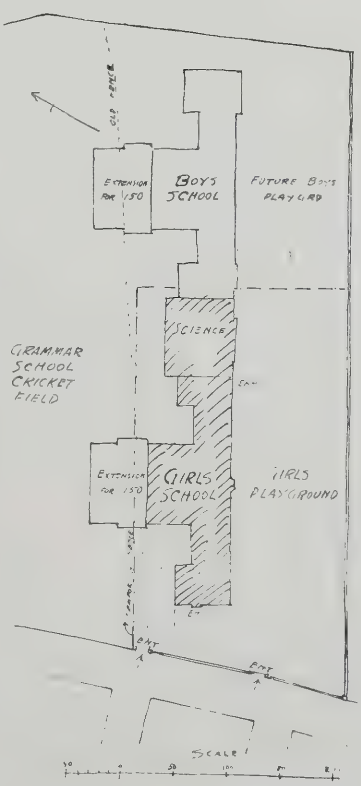
Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, April 24th, 1907.



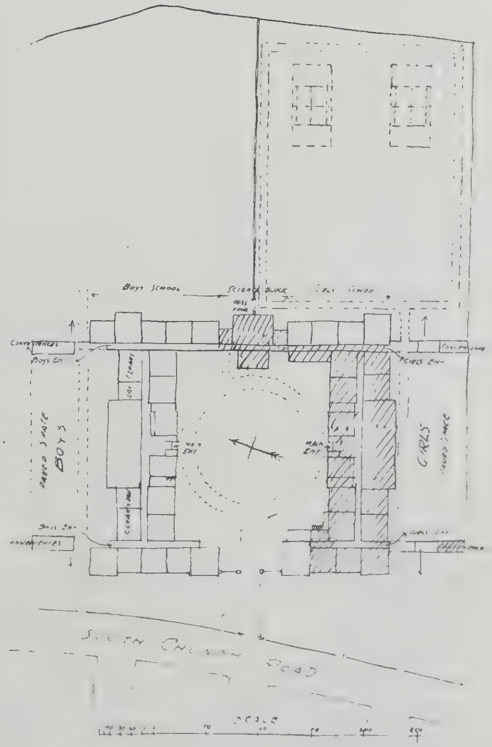
Ground-Floor Plan of Design Placed First. E. F. Reynolds, Architect.



Block Plan of Design Placed First.
E. F. Reynolds, Architect.



Block Plan of Design Placed Second.
Clark and Moscrop, Architects.



Block Plan of Design Placed Third.
Buckland and Haywood-Farmer, Architects.

COMPETITION FOR SECONDARY SCHOOL, BISHOP AUCKLAND, DURHAM.

Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
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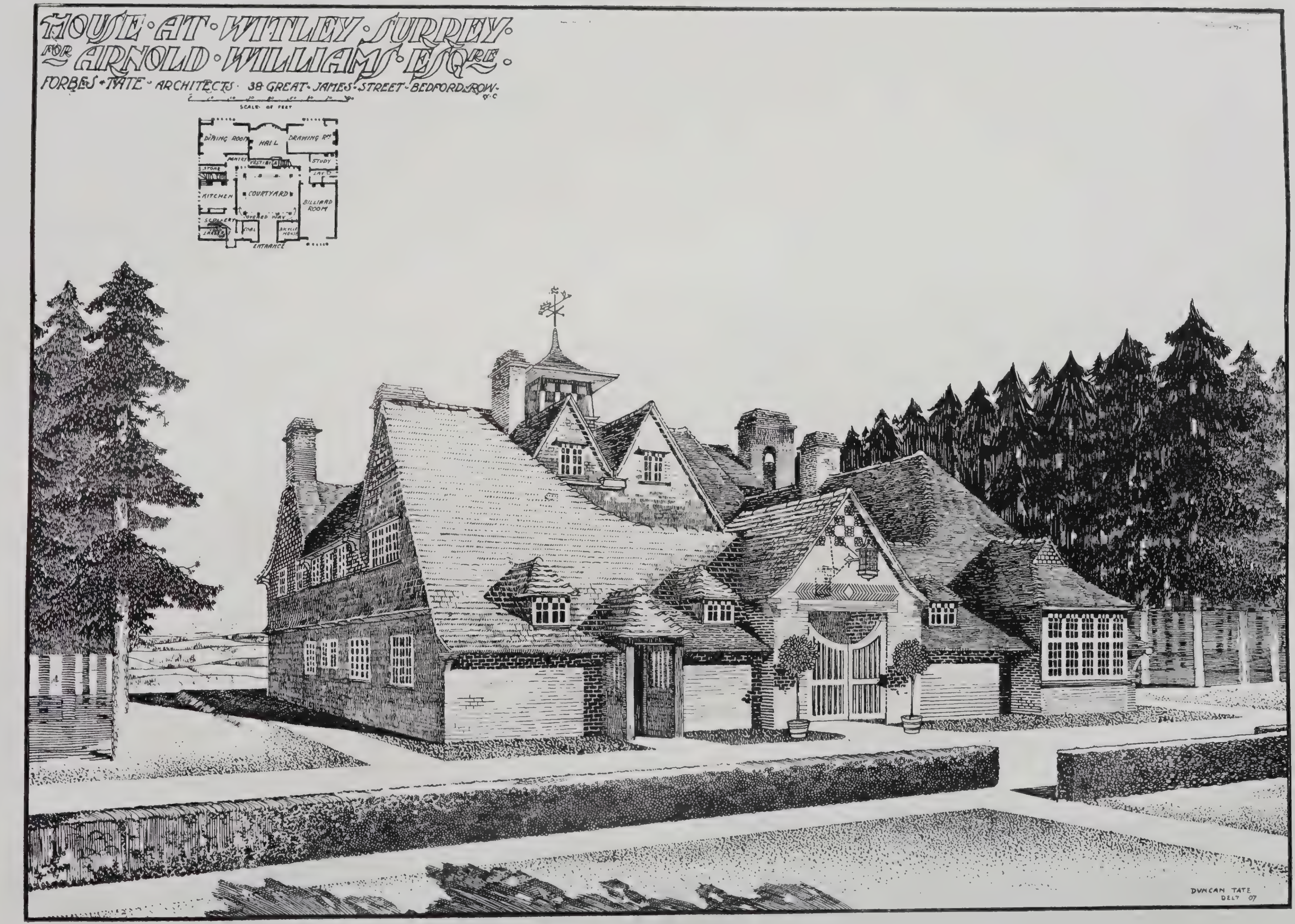

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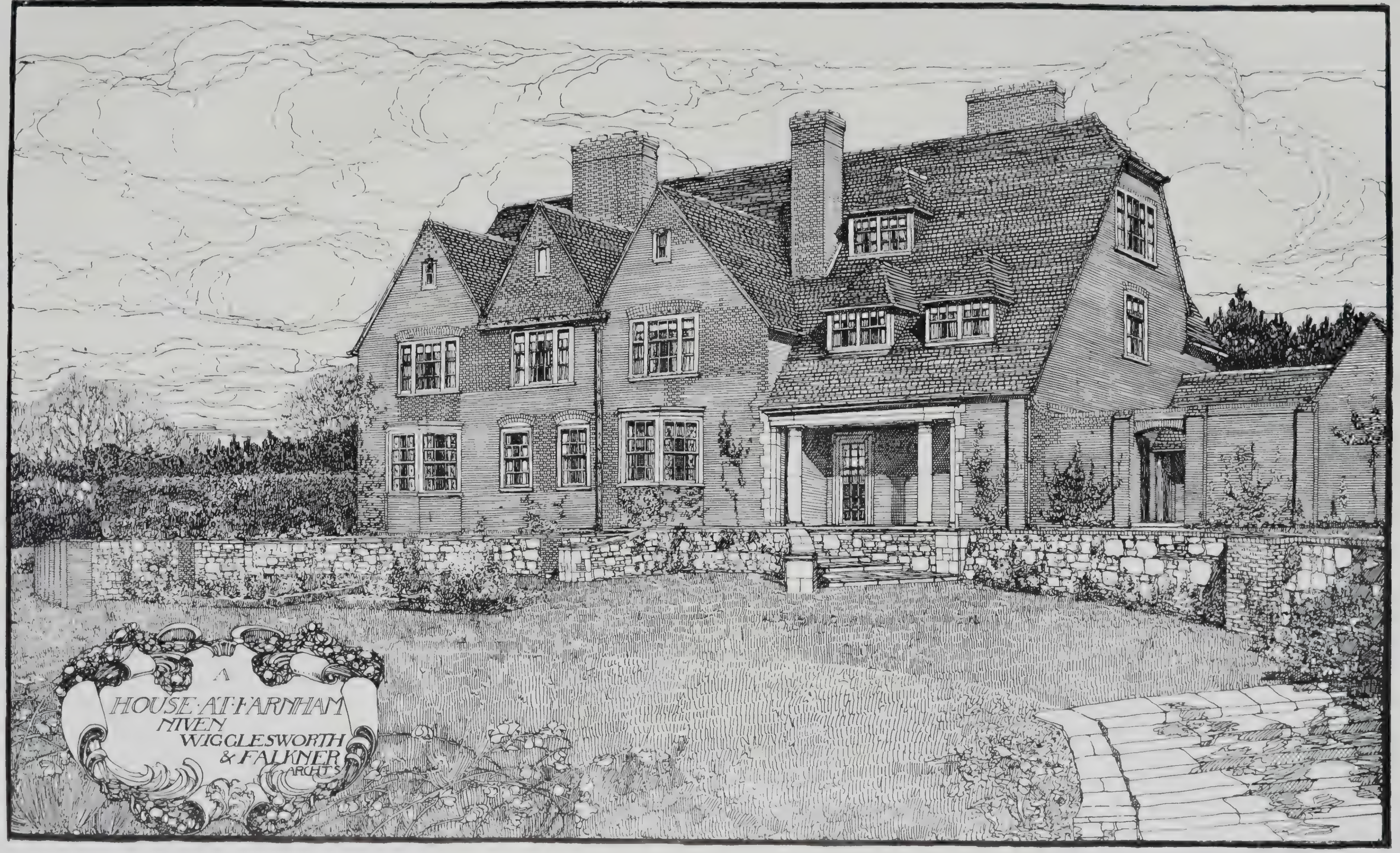

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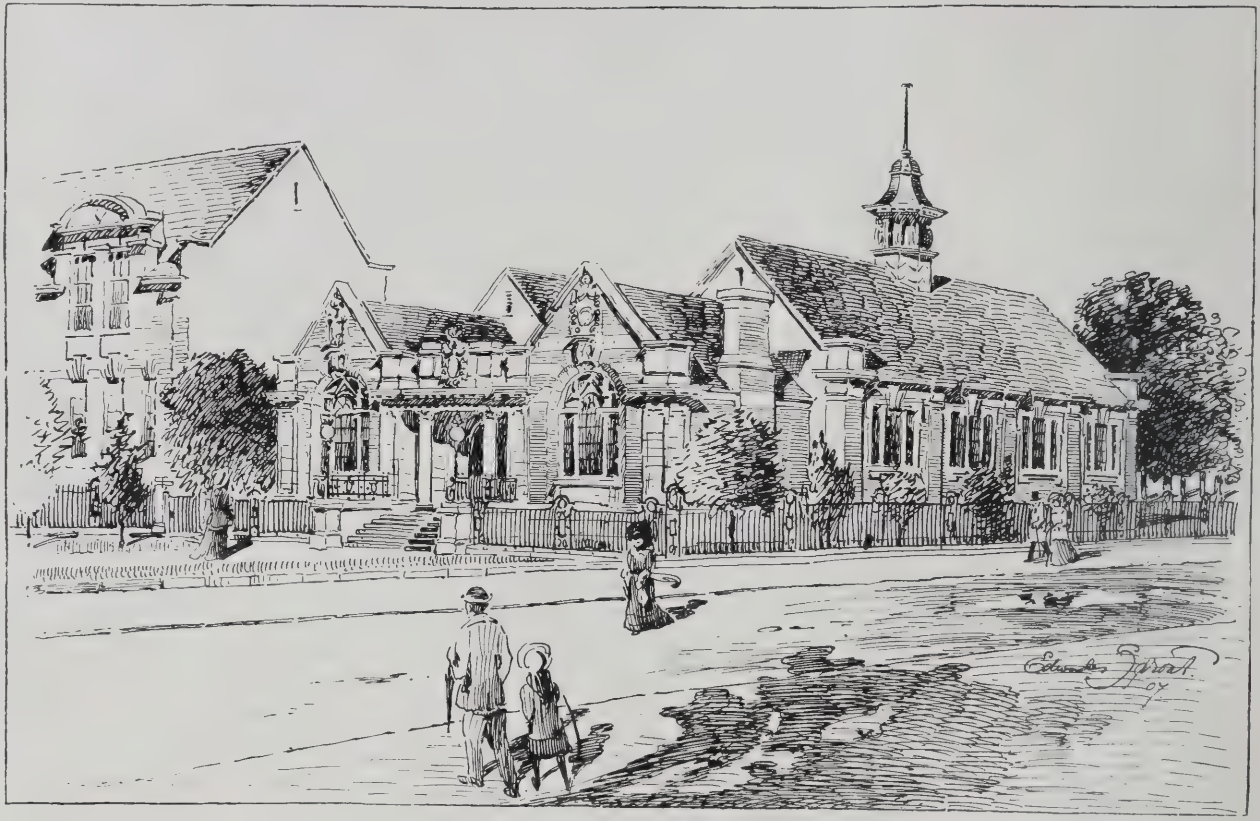

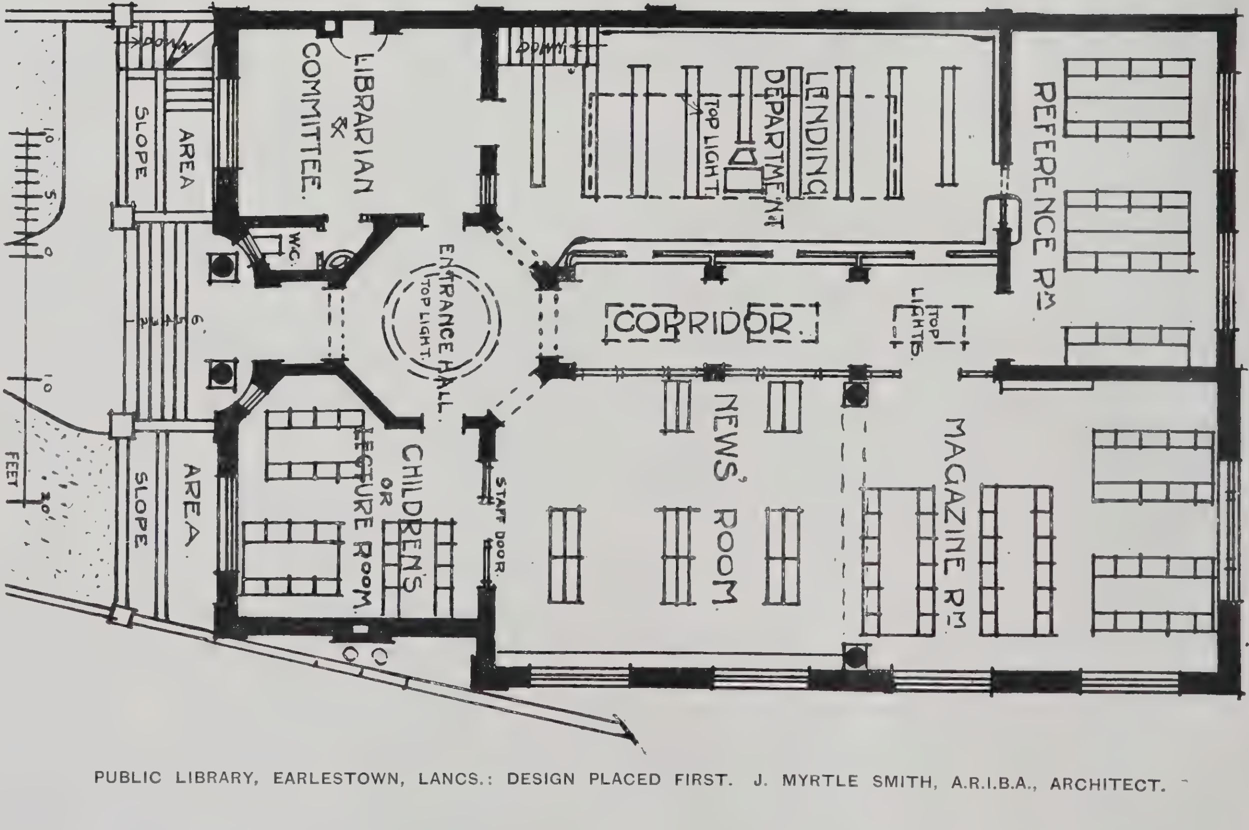

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April 24, 1907. Volume 25, No. 637

THE BUILDERS' JOURNAL

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Photographs and the Academy. Very soon now the summer exhibition at Burlington House will again be open to the public. It is opportune therefore to raise once more the question of photographs in the Architectural Room at the Academy, as it is hoped that by persisting in this matter a much-needed reform will eventually be brought about. Few persons will dispute the assertion that good photographs afford at once the truest and, to the cultivated eye, the most satisfying representations of architectural designs. That the Royal Academy desires the representation of architectural designs, and not clever perspective drawings, is proved by the acceptance of models and such working drawings as may effectively render the architectural quality of a design. Upon what basis, therefore, the inclusion of photographs is objected to we are at a loss to understand, unless we are to attribute it to that conservative policy which must always dominate the administration of important national art associations. These must ever confine themselves to setting the seal of their approval upon what is attested and assured, leaving to ephemeral and junior institutions the business of breaking new ground and inculcating new principles. It is in this respect that the Royal Academy, despite the many attacks, holds its ground, and continues to afford to artists the proudest satisfaction that distinctions of the character of diploma may give. The accepted of the Royal Academy may feel that he is no charlatan: he is no mere experimenter: he can at least do the thing as, generally accepted, it should be done. The falseness of the representations of the expert perspectivist has long been a cause for outcry. The glamour of this specious artist leads us to regard all such productions with suspicion, even when they are veracious, and we hesitate to affirm of any building what we might affirm of the impression given by the perspective drawing. There is a staleness about the perspective that fatigues us; we know how it is done; and we are apt to be more interested in the drawing as a drawing than in the subject of it as a building. We may form an opinion of the drawing, but we can form little opinion of the building. The facility of the draughtsman's station-point is also to be deplored. He is superior to all the facts of the case. It is a license which he has so assimilated into the processes of his craft that it has become a fixed convention which provokes no comment. We are quite content to be shown a design as seen if the observer were in a balloon or sunk into the earth, or gifted with psychic powers usually associated with the fourth dimension, which enables him to see through intervening streets, houses, and other obstructions as though they had no existence. The architect's skill in designing his building in harmony with its surroundings is stultified by the draughtsman who does not hesitate to make the surroundings harmonise with the building. The photograph has none of these defects. Photographs have long been accepted among architects as the most satisfactory method of presenting architectural designs. We claim, therefore, that they should no longer be excluded from the Architectural Room at Burlington House.

New, True, or Neither

Last week I undoubtedly found the cheapest place to dine in London. At meal times I went to the Building Trades' Exhibition. I asked intelligent questions at one of the stalls. I raised objections to the replies I got, and was then persuaded by the sophistries of the attendant. I asked minute particulars of prices for large quantities, made extensive notes in my pocket-book, sighed, and said I felt hungry. Sometimes I entertained a friend and we both sighed and felt hungry. I wiped off all obligations by offering a cigar; then I wrote in my diary: "Trades' Ex., business, two hours."

* * *

I was interested to see at the Exhibition samples of a new Norwegian marble which, it is justly claimed, can hardly be distinguished from the beautiful imitation scagliola now being manufactured of glass-furnace slag and drysalters' refuse. As, however, the marble is not much cheaper than the manufactured article, it is not likely to find favour among English builders.

* * *

In regard to guide-books, it is well known that such little matters as the styles of buildings described are left by authors to the printers' reader. I remember being asked many years ago by an acquaintance who was writing the topographical sections of a guide to London: "St. Paul's is Gothic of course, and Westminster Abbey is Classical?" I said, "Yes, that's right." When the book appeared I found, however, that the compositors, as usual, had entirely changed the scope and influence of the work by altering the architectural ascriptions.

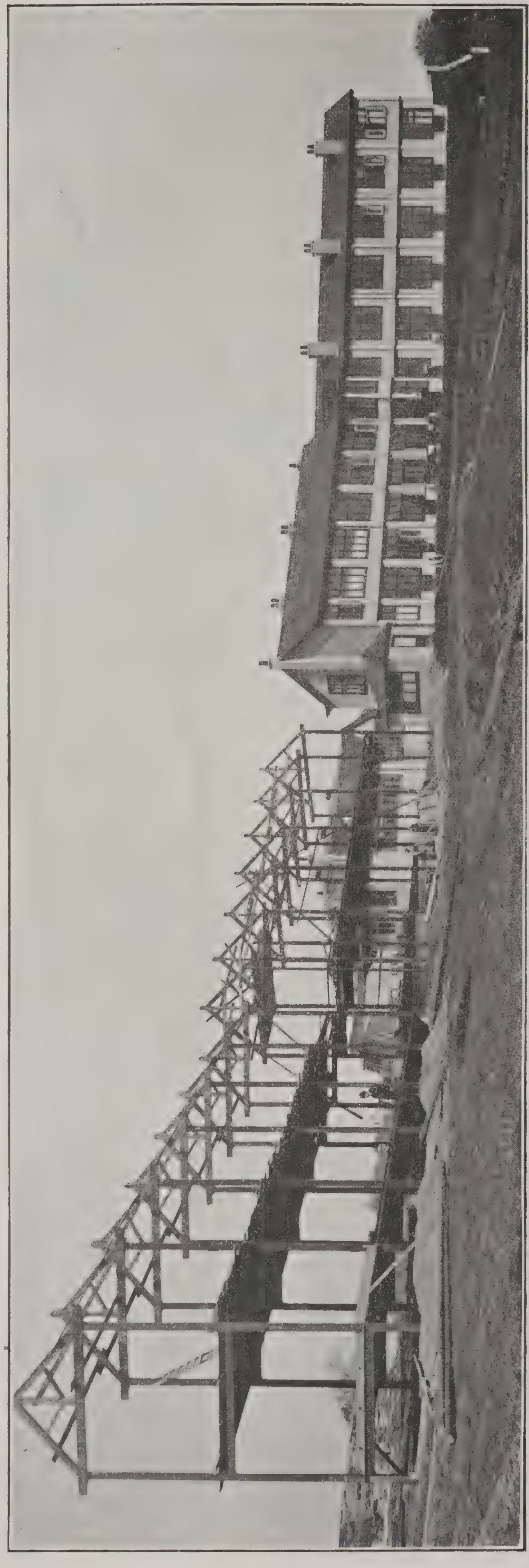
* * *

The report on the stability of St. Paul's Cathedral describes the building as being in a "sensitive condition." We learn from this that it takes four months for four eminent architects to decide on one eminently wrong word to express what they mean.

* * *

Sir Benjamin Baker, who claims to have spent a lifetime "burrowing under London," and to know every crack in the cathedral, points out that none of the eminent four has ever designed a sewer, and offers to stake his professional reputation that the sewer will not endanger the building. I suggest that the famous engineer should consult a sporting tipster before he again lay odds with the public, for by his wager, if accepted, the nation stands to lose both its cathedral and the world-wide reputation of a distinguished compatriot, and to gain nothing. I can only conclude that Sir Benjamin considers that the wrecking of his good fame will occasion a public rejoicing that will more than atone for the wrecking of the Cathedral. I differ from Sir Benjamin here.

The Looker-On.



SANATORIUM AT BENENDEN, KENT, IN COURSE OF CONSTRUCTION. A. WILLIAM WEST, ARCHITECT.

THE NEW SANATORIUM AT BENENDEN, KENT.

The accompanying illustrations show the new "National Sanatorium" which is being erected at Benenden, Kent, for the reception of patients subscribed for by various friendly societies who are supporting the undertaking. Only a portion of the sanatorium has been built, but it is intended to increase it to quite twice its present size as soon as funds are available. The building is being erected by the National Association for the Establishment and Maintenance of Sanatoria for Workers Suffering from Tuberculosis. This association is under the presidency of the Princess Christian, who laid the foundation-stone of the building. The sanatorium at Benenden is the first to be built by the Association. The site comprises 252 acres. Eventually the sanatorium is intended to provide accommodation for 200 patients, of whom 68 will be in the main building; the majority of the patients being accommodated in small buildings of inexpensive construction. Both male and female patients will be received, and, as customary, they will be housed separately, but, for the moment, both sexes will be temporarily accomodated in the one wing that has been erected. In allotting beds preference will be given to patients in the earliest stages of the disease. The affiliated friendly societies and trade unions have been invited to endow beds at about 25s. per week for the use of their members. Over 40,000 postal employees, among others, have consented to a regular deduction from their wages for the purpose of maintaining beds, and they are also subscribing to the building fund.

The special feature of the scheme is that the selected patients whose disease is arrested shall have the benefit of a certain amount of outdoor work, under medical supervision, and in time a properly-equipped farm for the partial training of suitable cases in agricultural and kindred pursuits will be developed. In this way it is hoped that the patients may be fitted for a return to wage-earning in different circumstances from those under which they acquired consumption, regrettable relapses being thus avoided.

The architect is Mr. A. William West (author of the Prize Essay in connection with the King's Sanatorium), and the general contractors are Messrs. Frazzi Fireproof Construction, Ltd., of Essex Wharf, Whitechapel.

Site and Plan.

The building is on the top of a hill, in a fine open position, and faces due south. The main patients' block is planned somewhat as a segment of a circle, with small sanitary wings projecting at the rear. Behind the patients' block are the dining hall and administration offices.

The portion at present built is the east wing, but, as seen from the general view on this page, the steelwork of the west wing has already been erected. The dining hall is also built, but is partitioned off to form a kitchen, larder, servants' hall, pantry, &c., together with a dining hall itself sufficient for present needs; at present it has a temporary cement floor, but later it will be laid with "Durolithic" (made by the Mosaic and Artistic Floors Co., Ltd.).

As regards the main building, on the ground floor there are 6 double-bed wards, each 12ft. square, and 5 single-bed wards; the latter occupy the first arm of the wing from the centre line, and the double-bed wards the outer arm. At the junction of these two portions there is a staircase leading to the upper floor. At the back of the single-bed wards is a corridor 5ft. wide, but the double-bed wards all communicate one into the other, and for them there is no corridor. The sanitary block is separated from the main building by a lobby, and it lies directly behind the staircase which leads to the upper floor; as stated above, it comes between the double and single-bed sections. The upper floor is practically a duplicate of the ground floor.

As regards the double-bed wards, they communicate with one another, and have no doors. There is a small anthracite stove in each ward, but it is expected to be very seldom required. Under each bed is a cotton-wool ventilator, for the purpose of preventing any stagnation of air in the corners of the room, as it has been found that those patients whose beds are against the wall do not progress so fast as those with a free circulation of air all round the bed. The single-bed wards are intended for the reception of patients upon their first arrival, as they are generally then in a very reduced state of health, and require careful nursing. When they have been built up somewhat they will be removed to the double-bed wards. In each of these single-bed wards there is also an anthracite stove. Over the partitions on the corridor side fanlights are arranged so as to give plenty of through ventilation. The doors of these wards are of solid teak, with flush panels; floors are also of teak, and all angles are rounded. At the end of the wing nearest the centre line, lobbies, a cloak-room and linen cupboard, &c., are arranged. At the outer end of the wing there is a semi-basement left by the fall of the ground, which is used as a heating chamber, with a steam boiler, disinfector, &c.

The lobbies lead to the sanitary wings, the floor of which is paved with "Durolithic." These sanitary wings are enclosed by swing doors, and contain on each floor three w.c.'s, four lavatory basins, and two bathrooms. In the lobby a housemaid's sink and a slop sink are placed. There are also some cupboards for boots, &c.

On the lower portion of the hill upon which the building stands a septic tank has been constructed by the Septic Tanks Syndicate, Ltd.; while upon another part of the site is a small pumping-room, the plant for which has been provided by Messrs. Duke and Ockenden.

Regarding the front of the building, there is a main cornice moulding at first-floor level, which forms a blind casing to take the blinds over the windows, which are pulled out the same as shop blinds, to form an awning. The woodwork is painted green, the walls rough-casted, and roofs tiled with Bridgwater tiles.

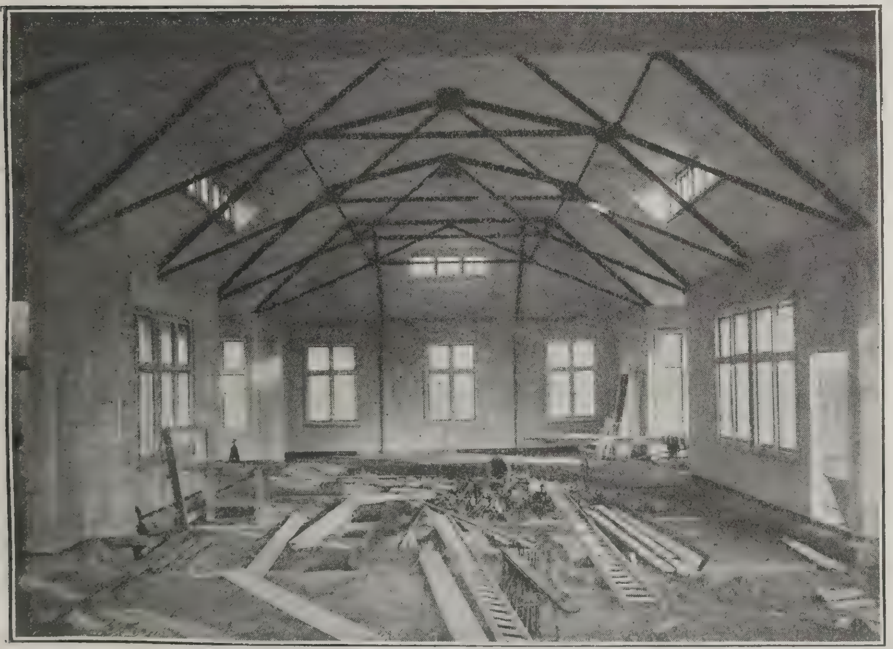
A good number of roads and paths have had to be formed over the site, and land drains have been laid.

The construction of the building

is perhaps the most interesting feature. Every endeavour has been made to build this sanatorium most economically. The cost makes a record for a permanent structure, working out at £100 per bed. This great economy has been made possible by the adoption of a new form of construction. The building has a steel frame, filled in with hollow terra-cotta partition and floor blocks. The system is now well-known under the name of "Frazzi" building construction. Fig 1 shows a plan of one of these walls, and it will be seen how the casing of hollow terra-cotta partition blocks is placed round the steel. The projections relieve the front in the form of pilasters. "Frazzi" partitions have the distinction of being extremely thin and light. The thickness is only about 3ins. The clay from which they are made is of quite exceptional quality; there are no other hollow terra-cotta partitions on the market which have equal strength with such thinness. The clay, too, in burning gives a porous body, which affords a good key for the plaster and renders the material far more fire-resisting than hard tile, and an additional key is given for plaster or rough-cast by grooving the partition blocks in manufacture.

The general form of the inner portion of the wings—namely, where the single-bed wards are situated, is shown in Fig. 2. As regards the larger span of the dining hall, the roof has been carried by light trusses, as shown by the view given below.

The whole of the partitions throughout the building have been constructed with "Frazzi" blocks, as also the floors. These latter are of 12-ft. span, the blocks being placed at 3-ft. 4-in. centres between 6-in. by 3-in. joists. The stanchions are 7ins. by 4ins., and the main girders are 9ins. by 4ins. The whole of the steelwork has been furnished by Messrs. Moreland & Son, and the "Frazzi" partition blocks, &c., supplied by Messrs. Frazzi Fireproof Construction, Limited. The ironmongery for the building has been supplied by Messrs. Hart, Son and Peard, and the sanitary fittings by Messrs. Davis, Bennett & Co.



View of Dining Hall in course of construction.

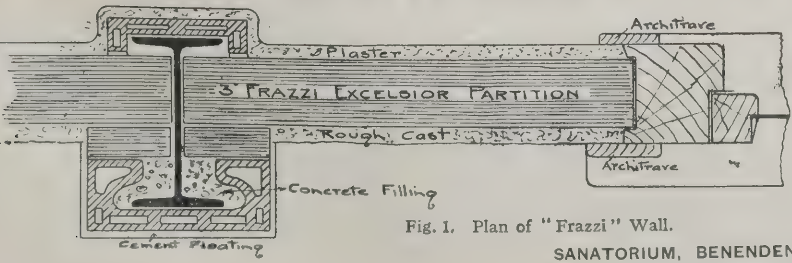


Fig. 1. Plan of "Frazzi" Wall.

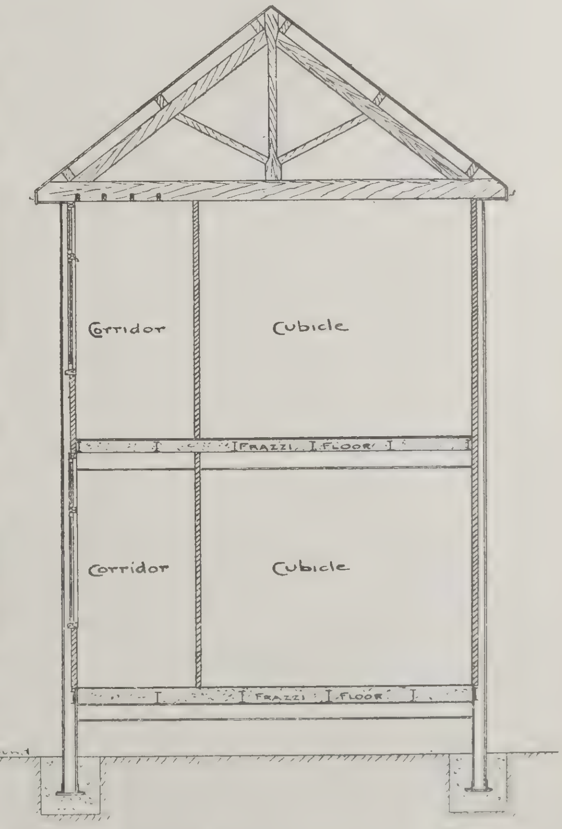


Fig. 2. Cross-section of Patients' Wing

SANATORIUM, BENENDEN, KENT.

R.I.B.A.

Art Galleries.

A meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W., the chair being occupied by Mr. Leonard Stokes.

The deaths were announced of Mr. F. B. Osborn, F.R.I.B.A., Mr. R. C. Harrison, F.R.I.B.A., and Mr. J. W. Donald, A.R.I.B.A.

A paper on "Gallery Building" was then read by Mr. A. W. Weissman, architect, of Amsterdam. The author said that in designing a gallery if the architect's chief concern was for the exterior to make a good first impression, the building would be a failure, as with many Continental galleries. Though the selection of a site was usually decided by the authorities alone, the actual position of the building and the grounds surrounding it needed the architect's most careful consideration, especially with regard to protection from fire in neighbouring buildings, and to the provision of the light best suited to pictures. Modern painters preferred top-lighted galleries. On the Continent, as a rule, gallery-buildings were of two or even more storeys, pictures being in the upper rooms, with skylights, and the ground floor containing antiquities, sculpture, &c. The staircase leading to the upper storey afforded a splendid opportunity for decorative treatment which would be out of place in the rooms. Visitors should be able to find their way with ease and not have to pass a second time through a room. There should be one entrance only. Dwellings were not desirable in gallery buildings.

Care should be taken to prevent the objects of art in a gallery suffering from dust, humidity, or sudden changes of temperature; exterior walls, therefore, should be made double. As regards heating, the best results were obtained by a low-pressure hot-water apparatus. The air between the ceiling and the roof should not be shut up, and openings should be provided so that the air of the room should rise to the glass roof, to be exhausted there by ventilators. Gratings could be placed in the walls near the floor, where fresh air was obtainable.

The author discussed the rules laid down by Magnus and Tiede for the ceiling lighting of gallery-rooms, and explained his own system of measurement in order to find the right proportion of light space to floor space, and to get the best light possible. He had found that a room was best if from 25ft. to 36ft. wide. Walls ought not to exceed 15ft. in height. The top light was found to be best when equivalent to half the floor surface. To prevent the floor being lighted too much, the centre part of the roof should not be glazed. In a room with side-light 22ft. from the window was the limit where sufficient light could be obtained; and in such a room there should be one window. The glass-line should be 7ft. from the floor, and the window run up to the ceiling. Rooms with side-light should be 20ft. high, and their length not exceeding 22ft.

A gallery-room should have restraint and repose, the walls quiet in design and colour, and decoration reduced to a minimum. The dado, which should be 3ft. high, should have a panelling of dark wood, left unpolished to prevent reflection on the mouldings. Instead of the ordinary picture-rods under the cornice, a small moulding should be placed along the wall, into which hooks could be screwed and removed at will, or the lowermost moulding of the cornice might be so designed as to support the pictures.

The author went on to give some notes on important gallery buildings in Europe—that at Brunswick, built from 1883 to 1887 by Mr. Sommer; the gallery at Cassel (1871-1877) by Herr von Dehn Rothfelser, which was unsurpassed; the Alte Museum at Berlin, built from 1825 to 1828 by Schinkel; the Kaiser Friedrich Museum, Berlin, built by Herr Ernst von Ihne; the National Gallery, London, spoilt architecturally by its low elevation, its insignificant dome, and its pepper-box turret (since the addition of the new wings and the central octagonal hall, however, the author considered the interior arrangement of the National Gallery to be one of the best to be seen, and the lighting extremely well managed.)

Having referred in more or less detail to Hertford House (the palatial home of the Wallace Collection), the Alte Pinakothek and the Neue Pinakothek at Munich, Semper's famous Dresden gallery and the Holmuseum at Vienna, the galleries at Brussels and Antwerp, and Mr. Cuypers' Ryksmuseum at Amsterdam, the author went on to describe the gallery buildings he had himself erected or designed. The City Museum at Amsterdam was built at a cost of £45,000 from 1892 to 1895. As there was no architectural style peculiar to the nineteenth century, the building had to be suggested more or less by the fine art of the time when there existed a style of interest in Holland. This style he found in the Dutch Renaissance of the beginning of the seventeenth century. But he did not follow closely the examples set by former ages. In designing the details he went his own way, avoiding the copying of sculpture and of the curvature of mouldings from ancient examples. The central hall contained the principal staircase, which had a skylight with glass of warm yellowish tone. Floors in the gallery-rooms were of teak parquet, oiled. Originally the walls of the rooms were painted, but now canvas in warm tints, such as olive green and deep red, had been put on them.

The author showed plans and gave a description of a house including a gallery-room which he had erected for a gentleman possessing a valuable collection of modern Dutch and French pictures. Particulars were also given of a scheme for rehousing with greater safety the masterpieces of Franz Hals, now exhibited in the ancient town hall of Haarlem.

The paper was illustrated by a large number of plans and views of the various buildings described.

A vote of thanks to the lecturer was proposed by Sir L. Alma-Tadema, seconded by Mr. J. D. Crace, and supported by Sir Aston Webb, Mr. H. H. Statham, Mr. Alfred East, Mr. Reginald Blomfield, and the chairman. Sir Alma-Tadema observed that painters did not use top light to paint with, and therefore top-lighting only in a gallery was not desirable. What was wanted was a top-light and a side-light. Sir Aston Webb agreed that a top-side-light was the best for pictures. In the new gallery which Mr. McKim was building in New York for Mr. Morgan high side-lights were adopted, following the practice of the Louvre galleries, which had been considered to be the best lighted of their kind in Europe. As regards proportions, he had found that 32ft. was a good general width, and 22ft. a suitable height.

R.I.B.A. PRIZES AND STUDENTSHIPS

Particulars of the prizes and studentships for 1908 have just been issued from the offices of the Royal Institute of British Architects, 9, Conduit Street, W. (price 3d. to non-members). The prizes are as follows:—

Soane Medallion and £100.—Subject: "A custom house erected on a quay at the head of a dock basin."

Tite Prize (certificate and £30).—Subject: "An open-air theatre to seat 500 people."

Grissell Gold Medal and 10 guineas.—Subject: "An elevated tank in reinforced concrete" (tank to hold 150,000 gallons, and to be 75ft. above ground).

Essay Medal and 25 guineas.—Subject: "The function of colour in street architecture."

Henry Saxon Snell Prize (£60).—Subject: "Design for a general hospital suitable for a provincial town, with about 200 beds."

Measured Drawings Prize (silver medal and 10 guineas).
Pugin Studentship (silver medal and £40).
Godwin Bursary (silver medal and £65).
Owen Jones Studentship (certificate and £100).
Arthur Cates Prize (40 guineas).
Ashpitel Prize.
} As before.

Our Plates

Particulars of the competition designs for the secondary school at Bishop Auckland and the free library at Earlestown will be found on pp. 206 and 207 of this issue.

The house at Witley is now being completed. It stands in a clearing in the pinewood on the Hog's Back, on the highest point of this Surrey ridge, and the prospect has influenced the planning. The house has a formal garden, laid out by Miss Jekyll, and a terrace with low walls in red brick. To the south, running to the extreme edge of the ridge, the ground falls sharply for more than 180ft. The house is built of local bricks of varying texture and very dark colour; the pointing is very dark also, joints being set back. The roofs are covered with local tiles stained with a solution. Inside the courtyard there are a number of old oak posts and lintels. Messrs. Forbes and Tate, of 38, Great James Street, Bedford Row, W.C., are the architects.

Obituary.

Mr. F. B. Osborn, F.R.I.B.A., of Birmingham, died on April 6th, in his 67th year.

Mr. A. H. Skipworth died recently. He was an architect of great talent, his designs for church work exhibiting much originality. In actual buildings there is not a great deal to point to, St. Etheldreda's, Fulham, being the chief. But in designs (those exhibited at the Royal Academy especially) he exhibited a talent which it is to be regretted was not more widely appreciated.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.
The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.
Correspondents are particularly requested to be as brief as possible.

Early English and Decorated Work in London

STOURBRIDGE.—PUPIL writes: "Please suggest one or two subjects in the Early English or Decorated styles in London to measure for the R.I.B.A. intermediate examination; preferably in S. or S.W. districts."

London, and more particularly the south or south-west districts, is not remarkable for an abundance of buildings of the Early English or Decorated periods which could be profitably studied for the intermediate examination of the R.I.B.A. Westminster Abbey is, of course, foremost in its claim, and such a subject as the doorway from the north-east angle of the cloisters to nave, a bay of the cloister, or a portion of the vestibule to chapter-house would be quite suitable for measurement if permission could be obtained, but this is not readily granted. The Temple Church (nave *circa* 1185, choir *circa* 1240) could also be studied, and a measured drawing made of, say, one of the choir lancets. The eastern aisles of St. Saviour's, Southwark (*circa* 1213-38), or the Decorated doorway at St. Alphage, London Wall (see "Architectural Review" for March), would also furnish subjects. Further afield, Stone Church, near Dartford, Kent (*circa* 1251-74), is a favourite hunting-ground, where students are readily tolerated. G.

Continuous Girder Problem.

CARLISLE.—S. L. writes: "In designing a continuous girder over three spans, that will be of uniform cross-section throughout, and subjected to an equally distributed load all over, what arrangement of the spans will produce the least maximum bending moment and what formula expresses this? What will be the reaction of each support (this, I take it, will also give the maximum shear)?"

Suppose a continuous girder of three spans is of total length L (Fig. 1), and subjected to a uniform load of p tons per ft. run. Then the least maximum bending moment will occur when the end spans are equal. Suppose these end spans are l and the centre span l_1. Then, applying the theorem of three moments to the first two spans, we get

$$\mathrm{M_A} \,.\, l + 2\mathrm{M_B}\ (l + l_1) + \mathrm{M_C} \,.\, l_1 = \frac{p}{4}\ (l^3 + l_1^3)$$

But here $\mathrm{M_A} = 0$ and by symmetry $\mathrm{M_B} = \mathrm{M_C}$

$$\therefore \mathrm{M_B}\ (2l + 3l_1) = \frac{p}{4}\ (l^3 + l_1^3)$$

$$\therefore \mathrm{M_B} = \frac{p}{4}\left(\frac{l^3 + l_1^3}{2l + 3l_1}\right) = \frac{p}{4}\left\{\frac{l^3 + (\mathrm{L} - 2l)^3}{3\mathrm{L} - 4l}\right\}$$

because $\mathrm{L} - 2l = l^1$.

It will be found that this expression has its least value when l is nearly equal to ⅓ L. ∴ the least maximum bending moment occurs when all spans are equal. Then if each span $= l$

$$\mathrm{M_B} = \frac{p}{4}\,\frac{2l^3}{5l} = \frac{pl^2}{10}$$

The bending moment diagram is then as shown in Fig. 2. In this case the maximum bending moment occurs at the centre supports. In any other kind of loading the maximum bending moment will occur either at the centre supports or at intermediate points on the curves according to the loading. To get the reaction at each support proceed as follows:—The negative bending moment at B is equivalent to a force of $\frac{pl}{10}$ at A.

$$\therefore \text{Reaction at A} = \frac{pl}{2} - \frac{pl}{10} = \frac{2}{5}pl$$

$$\therefore \text{Reaction at B from first span} = \frac{5pl}{5} - \frac{2pl}{5}$$

The end bending moments on the second span are equal, and therefore they do not alter the reactions at this span.

$$\therefore \text{Reaction at B from first span} = \frac{pl}{2}$$

$$\therefore \text{Total reaction at B} = \frac{pl}{2} + \frac{3pl}{5} = \frac{11pl}{10}.$$

Their reactions C and D will be $\frac{11pl}{10}$ and $\frac{2pl}{5}$ respectively. The shear diagrams are then obtained as shown. A.

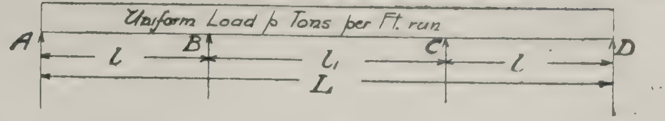


FIG. 1.

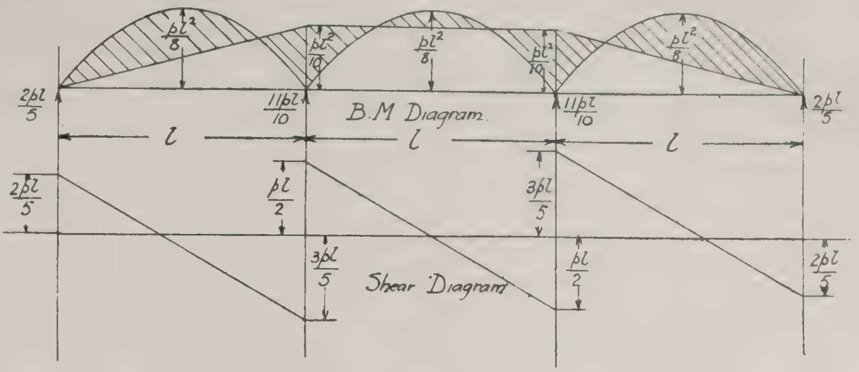


FIG. 2

CONTINUOUS GIRDER PROBLEM.

Agreement for House.

LONDON.—X writes: "What notice is legally necessary to terminate an agreement under the following conditions:—(1) Agreement made to let house for 15 months. (2) Tenant, on giving three months' notice, has option of remaining on annually at same terms. (3) Tenant has remained several years, and now wishes to leave. (4) Rent has been paid monthly in advance, according to agreement. (a) Is three or six months' notice necessary to terminate such an arrangement? (b) Would it be construed in a court of law that the three months' notice necessary to continue the tenancy in the first case was sufficient to terminate it now?"

This tenancy has become an annual one, expiring on the anniversary of the day on which the first term of fifteen months expired: it appears odd, however, that you should have an agreement precisely stipulating that rent should be payable monthly in advance, and yet silent upon the question of notice! (a) A yearly tenancy (apart from agreement) requires half a year's notice to terminate it, and I advise you to give that notice in this case, inserting also the words "or at such other time as the year of my tenancy shall expire" after the date at which you propose to quit has been stated. (b) The three months' notice you mention in clause 2 of your enquiry has nothing to do with the question. This was a period fixed within which the tenant was to give notice of his intention to afterwards *accept* an annual tenancy and was not at all a notice to *terminate* (his tenancy would have ended at the expiration of the first fifteen months without any notice). The above reply refers to property other than agricultural: for this latter a full twelve months' notice must be given under the provisions of the "Agricultural Holdings Act, 1883," and its subsequent amendments.

F. S. I.

Surveyors' Charges.

LONDON.—A. M. B. writes: "(a) What are the customary charges for surveyors for measuring up sub-contractors' work—namely, plastering, tiling, &c.? (b) Is it within your province to give any information as to customary remuneration for catalogue illustration work done at home, say, for a wholesale ironmonger?"

(a) The R.I.B.A. have not included this work in their scale, but a fair charge would be from 2½ to 5 per cent. upon the cost, the precise amount depending upon the magnitude of the work. Three guineas per day is a usual fee if a charge be made by time. (b) Purely a matter of bargain; terms should be settled beforehand: it is merely draughtsman's work.

F. S. I.

Asbestos Roofing Tiles.

OXON writes: "Where can I obtain particulars of Prof. Hatscheck's (of Vienna) asbestos roofing slates?"

The slates to which you refer are obtainable in this country through Messrs. G. R. Speaker & Co., of 29, Mincing Lane, E.C.: they are known as "Eternit."

Planning of Pump Rooms.

MANCHESTER.—AN OLD READER writes: "Where can I obtain information on the planning and construction of pump rooms and mineral baths?"

This subject is too specialised for the literature dealing with it to be very extensive. Plans of the new pump room at Bath appeared in the "Architectural Review," Vol 18. There are books on "The Mineral Baths at Bath" by C. E. Dairo (Spon, 1883); "Spas, Pump Rooms, and Principal Sea Bathing Places of England" (1841); "Do., do., of Germany" (1837), by A. B. Granville. (These are in the library of the R.I.B.A.) "The Hydropathic Establishment and its

Baths," by R. O. Allsop (1891), might also furnish some information, and Mr. Cross's new book on "Public Baths and Washhouses" is useful for general points of bath construction. G.

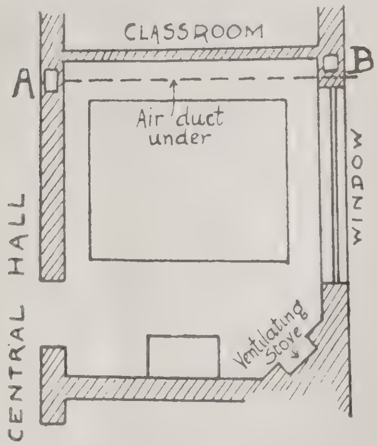
Choir Stalls.

BIRMINGHAM. — ARCHITECT writes: "Kindly give me a rough sketch of some choir stalls as per plan (not reproduced). I ask your advice because I want them to be as perfect as possible for comfort and convenience. Please give the height and width of seats, &c., and other dimensions, also slopes to seats. Two rows of seats are all that are required."

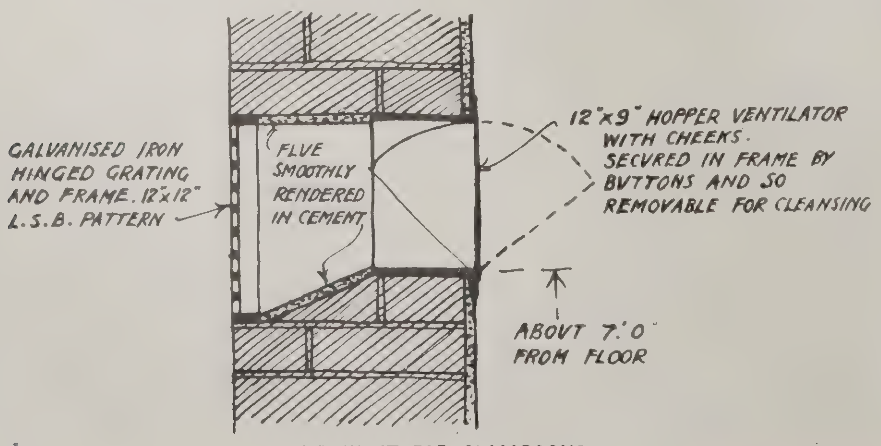
You ask too much. We are prepared to extend the scope of these "Enquiries Answered" very widely, but we cannot undertake to supply architects with designs for work which comes in their everyday practice.

Ventilation of Classrooms.

X writes: "The accompanying sketch is of a classroom in a secondary school taken at ground-floor level. Are the fresh-air inlets shown at A and B in the best positions, and is it preferable to have a solid wood-block floor on concrete with an air-duct laid to the outside wall from A, rather than an ordinary wooden floor having, say, 12ins. air-space between underside of joists to top of concrete bed, and so obviate the necessity of air-duct?"



The air-inlets shown at A and B are in suitable positions, though it is not always held necessary to carry fresh-air to inlets on internal walls. If the "ventilating stove" marked on plan is of the type admitting warmed fresh air, and suitable provision is made for the extraction of foul air, either by a central ceiling ventilator so constructed as to obviate down-draught, or by a flue drawing air near the ceiling level and carried up with the smoke flues in chimney stack, a satisfactory result should be obtained. A solid floor is greatly to be preferred to one of joists and boarding. Even with the latter, an air-duct drawing directly from the outside air would be desirable for the inlet on the wall next the central hall. Dust would be certain to accumulate in the space below the flooring, which it would be impossible (or at any rate inconvenient) to cleanse. This applies, though with lesser force, to the air-duct suggested, and is a great argument in favour of a system of air supply as direct as possible. Though it is, of course, perfectly simple in devising any ducts or flues made use of, to ensure that cleansing is easy, it is almost certain to be neglected. On the whole, the best simple system of air supply seems to be the provision of direct inlets, as shown by sketch below, dispensing with all hidden passages. G.


GALVANISED IRON HINGED GRATING AND FRAME. 12"x12" L.S.B. PATTERN
FLUE SMOOTHLY RENDERED IN CEMENT
12"x9" HOPPER VENTILATOR WITH CHEEKS. SECURED IN FRAME BY BUTTONS AND SO REMOVABLE FOR CLEANSING
ABOUT 7.'0" FROM FLOOR

AIR INLET FOR CLASSROOMS.

Land Surveying.

ST. LEONARDS.—"I should be glad to know whether A. Nesbit's book on 'Practical Mensuration,' published in 1846 at 6s., is in accordance with the up-to-date methods of land surveying, levelling, and general mensuration."

Although there is much that is good in Nesbit's "Practical Mensuration" there is also much that is out of date, so that it would hardly be advisable for you to study from this book. "Surveying and Surveying Instruments," by G. A. T. Middleton, is a good practical book on the general principles of land surveying, while "Surveying," by J. Whitelaw, junr., is perhaps the best all-round book on the subject. H. Y. M.

Buildings to Measure near Camberley.

CAMBERLEY.—W. G. writes: "Kindly name some buildings near Camberley suitable to measure for the R.I.B.A. final examination. Is it necessary to measure up in the style selected? Could you also recommend me the best books to study for the South Kensington building construction examination, honours?"

There are many buildings within reach of Camberley which can be measured for the R.I.B.A. final examination. A good subject would be the Lucas Almshouses at Wokingham (illustrated in Messrs. Belcher & Macartney's "Later Renaissance Architecture in England"). The medieval timber porch at Binfield, or Bishop Jewell's porch at Swallowfield, Berks, Bramshill House (1607-12), near Winchfield, Hants, or any of the excellent Renaissance work in and about Farnham or Guildford would provide suitable subjects. Though it is not compulsory that the subject chosen for measurement should be in the style selected, it is obviously desirable to study that style the more closely, to which end the measurement of good examples is a valuable means. In reply to your second question, it is useless to attempt to study from one or two books. A general survey of the ground to be covered can be gained from such works as Mitchell's "Building Construction," Fletcher's "History of Architecture," "Specification," &c., but see also the lists of books suggested to R.I.B.A. students in the Institute Kalendar. G.

Bay Windows and Building Line.

MANCHESTER.—P. C. writes: "I am about to build some houses with one-storey bay windows. The building line is 6ft. from the street line. Can I project a 2ft. 6in. bay window in front of this line? Is the face of the bay windows called the building line?"

You do not state whether the "building line" is one fixed by the local sanitary authority or by a private landowner. Speaking generally, the projection of the bay windows would form an infringement of the "building line" regulation; but in many private cases it is allowed to pass unchallenged. I advise you to keep your building back—you lose nothing by so doing. F. S. I.

Steel Square.

SHERBORNE.—M. writes: "I have a steel square marked with a brace measure, 8 square, and 100 scale, and Essex New Board measure. Can you explain same, or recommend a book dealing with the above?"

Regret that I cannot explain the scales on this rule. References to the steel square may be found in some of the modern books, especially American, and articles on its use appear in Nos. 589 and 599 of "Building World."

HENRY ADAMS.

Concrete for Motor Pits.

WISBECH.—W. writes: "Is it correct that cement concrete paving is unsuitable in motor pits, and wherever petrol is likely to be spilt on same? A friend tells me that motoring journals condemn it as dangerous, saying that the petrol penetrates the concrete and renders it inflammable for a long time afterwards."

It depends whether the concrete is porous or not. If it is made with coke breeze it would be extremely dangerous; but if it is made with gravel, there would be no danger of the petrol penetrating into it. Concrete has been extensively used for motor pits, and we have never heard of any such trouble as you mention.

Requirements for Presbyterian Church.

HASLEMERE.—SUBSCRIBER writes: "Are there any special requirements in a Presbyterian church, and are these as a rule built with the altar facing east? What is a fair price per cubic foot for building such a church—say, to seat 600 people, brick with stone dressings and wood roof (open)? Can you give me the address of any firm publishing the 'Practical Mathematics' examination papers of South Kensington?"

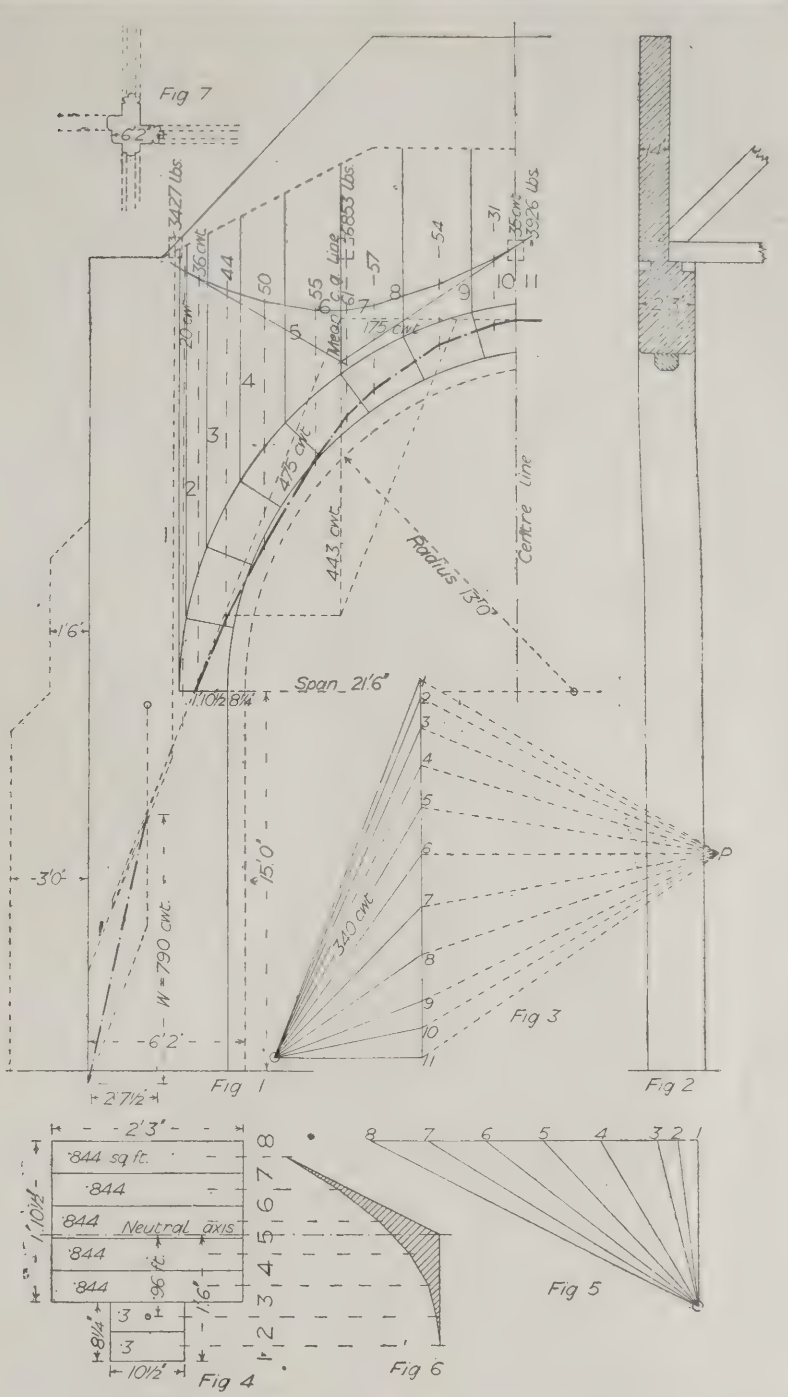
I have no knowledge of the requirements of Presbyterian churches. A fair price for a church of brickwork, with stone dressings and open timber roof, would be 7d. to 8d. per cub. ft., or £5 per sitting. The solutions to the "Practical Mathematics" examination of South Kensington are not published. X.

Stability of Arch and Abutments.

Kimberley.—South Africa writes: The accompanying drawing shows the transept arch and pier of a church in which, owing to lack of funds, the chancel will not be built at the same time as the nave and transepts; hence the pier must be capable of withstanding the whole resultant load of transept arch. I should be greatly obliged if Prof. Adams would advise as to calculations for arches like this, in receding orders, and at the same time state what should be the least dimensions for a pier of sufficient stability in this particular case. Please recommend also a good textbook on stresses in Gothic arches and vaulting. The Journal is very popular here."

The proposed transept arch and abutment are shown in the elevation Fig. 1, and in section Fig. 2. The inner stone arch may be left out from the first part of the calculation. Divide the arch, Fig. 1, into any convenient number of assumed voussoirs, and find the weight and centre of gravity of each as shown. Set down the load line Fig. 3 and select any pole P. Draw vectors and across the corresponding spaces in Fig. 1 construct the funicular polygon shown by full line above the arch; the intersection of the lines parallel to the two outer vectors will give the position of the mean centre of gravity line. Then by the parallelogram of forces, as shown by dotted lines, the thrusts at abutment and crown may be found. From point 11 in Fig. 3 set out the horizontal thrust at crown to give point 0. Draw vectors, and by parallel lines across their respective spaces in Fig. 1 obtain the curve of thrust shown by thick stroke-and-dot line. As the curve of thrust passes outside the brick arch the stone portion must now be taken into account. Draw out the section of arch as in Fig. 4. Divide into any number of parts and find the area and centre of gravity of each part. Set these areas down on the horizontal line in Fig. 5. Select pole 0 at right angles to this line so that 1—0 equals half of 1—8. Draw vectors, and by parallel lines construct the inertia area Fig. 6. Then $I = Aa$ where I = moment of inertia, A = total area of section, a = inertia area, and in the present case $I = 4{\cdot}82 \times 1{\cdot}03$ = say 5 and the section modulus $z = \frac{I}{y} = \frac{5}{1{\cdot}5} = 3{\cdot}33$. The worst portion of the curve of thrust is across space 5 in Fig. 1, which is shown by a small circle in Fig. 4. Then $\frac{W}{A} \pm \frac{M}{Z} = \frac{340}{4{\cdot}82} \pm \frac{340 \times 0{\cdot}96}{3{\cdot}33} = 70 \pm 98 = 168$cwt. or 8·4 tons per sq. ft. compression and 28cwt. or 1·4 tons per sq. ft. tension. This is too great a stress, so that another half-brick ring should be added to the brick arch, making it 6 half-brick rings thick. The abutment, as in plan, Fig. 7, is rather complex, but may be taken as 6ft. long by 2ft. 3ins. wide. The final resultant will then be found as follows:—Combine the thrust at abutment of arch Fig. 1 with the load of 3,427lbs. from roof principal. Next combine the resultant so found with the weight of abutment to give the final resultant, shown by stroke-and-dot line, cutting the base at 1½ins. from the outer edge. Then $\frac{W}{A} \pm \frac{M}{Z}$ $\frac{790}{12{\cdot}4} \pm \frac{790 \times 2{\cdot}625}{\frac{1}{6} \times 2{\cdot}25 \times 5{\cdot}5^2} = 63{\cdot}7 \pm 183 = 246{\cdot}7$ or 12·33 tons per sq. ft. compression, and 119·3 cwts. or 6 tons per sq. ft. tension. This stress is much too great, and the dotted buttress Fig. 1 must be added and well bonded to the other work. Working this out in the same way $\frac{W}{A} \pm \frac{M}{Z} = \frac{910}{19{\cdot}1} \pm \frac{910 \times 1{\cdot}33}{\frac{1}{6} \times 2{\cdot}25 \times 8{\cdot}5^2} = 47{\cdot}6 \pm 45 = 92{\cdot}6$cwts. or 4·63 tons compression at outer edge, and 2·6cwts. or 0·13 tons compression at the inner edge, which will be satisfactory.

HENRY ADAMS.



STABILITY OF ARCH AND ABUTMENTS.

The Ionic Volute.

O. writes: "I should be glad if you could refer me to an illustration in your journal showing the method of setting-out the Greek Ionic volute of the capital of the Ionic temple on the Ilissus. The diagram in Normand's 'Parallels' is not very explanatory, and other books that I have do not give this particular volute."

The drawing of the Greek Ionic volute is described and illustrated on page 477 of our issue for January 23rd, 1901. We would also refer you to the paper on "The Origin and Construction of the Ionic Volute," read by the late Mr. F. C. Penrose before the Royal Institute of British Architects on November 17th, 1902, a report of which is given on page 233 of our issue for November 19th, 1902, and the full paper, with illustrations, in the Institute "Journal" a little later.

Sanitary Inspectors' Examinations.

Cumbo writes: "Please give me the name and address of the secretary of the sanitary inspectors' examination board."

Upon application to the secretary of the Royal Sanitary Institute, Parkes Museum, Margaret Street, London, W., you can obtain a printed syllabus of the examinations to which you refer. F.S.I.

Distemper.

London.—W. writes: "Kindly inform me of a method of making up a cream-coloured distemper for colouring external rough-cast on brick. I require a distemper that will not be affected by rain."

We recommend you to use one of the several well-known washable distempers on the market.

BISHOP AUCKLAND SECONDARY SCHOOL COMPETITION.

The designs submitted in this competition were on exhibition on April 1st and 2nd in the Assembly Rooms, Durham, but at that time the award had not been made public, and the assessor's report had not been accepted by the committee, with the result that there was no means of identifying the premiated designs, and the attendant in charge could give no information on the subject. This unusual procedure naturally caused much comment among the members of the profession who had travelled some distance to view the designs, and the explanation which is now given cannot be regarded as satisfactory. This explanation is to the effect that, owing to the large number of drawings received—177 different schemes—it was necessary to engage the largest hall in this small cathedral town for the public exhibition, and the committee had to take the first available dates when the Assembly Rooms were free. It so happened that these dates were Easter Monday and Easter Tuesday, and competitors received rather short notice even about this.

For the most part the designs shown were commonplace, there being only a dozen schemes worth looking at. After the Barnsley Secondary School award (made by the same assessor—Mr. E. R. Robson) it was only natural to expect this competition to be boycotted by the unfortunate competitors there, who comprised leading school architects throughout the country. It was noted that only one of these competed again, with the exception, of course, of the Birmingham firm which was placed first at Barnsley. Many assistants and architects who had no knowledge of school work sent in designs; this the drawings clearly showed, as well as the 616 questions asked in the face of clear, concise and well-got-up conditions. It is to be regretted that so much time and poor talent were spent on this competition by many who signed "architect" after their names, and yet could neither draw, plan nor design in an elementary manner. To stand a chance of being successful in a public competition the work has now, as a rule, to be of very high quality, and must show a serious study of the problem in hand.

Site and Conditions.

The ground set aside for the proposed school is a long, narrow strip of land facing south and west, with the main thoroughfare—South Church Road—on the west side. A suggested boundary line practically determined the shape and position of the buildings on the site.

The conditions stated the accommodation and approximate size of the rooms, which comprised the following:—Girls' school (for 250 with power of enlargement to about 400), four classrooms each to seat 25, and five classrooms with 30 scholars in each room; also a large assembly room and examination hall in one, with two teachers' rooms and conveniences; dinner room to accommodate 100, with kitchen, &c., attached; a bicycle shed and game store completing the list for the present school. A future boys' school with the same accommodation had to be shown on the plans in outline only. The science block had to be accessible separately from girls' and boys' schools, and the rooms asked for in this department included a large elementary and physics laboratory, two advanced chemical and physics laboratories, with balance, lecture, preparation, and store rooms. No special sum per head was stated, the suggestion only being made that the committee were desirous of obtaining a thoroughly good public building of suitable character without display or extravagance. A further statement in the conditions was that about economical schemes which could be carried out at a small cost with the greatest number of classrooms on the level of the hall; a statement which evidently strongly influenced the assessor in making his final selection.

Design placed First.

The scheme awarded the first place is that of Mr. Edwin F. Reynolds, of Birmingham. The ground-floor plan and block plan are given on the centre plate in this issue. None of the other plans were comparable with it, particularly as regards economy of space, minimum of corridor compatible with efficient service and ready means of access to all departments. The position of the buildings does not break up nor occupy too much of the site to the detriment of the playing fields. The plans comply with the conditions, all the classrooms being placed on the hall-level, with the exception of the future extension. Some minor rooms have suffered in light and air in order that the plan might be regular in outline, and also to save cube contents. One of the cloak-rooms is badly lighted and doors might lead into this room from the lavatory. The lighting of the large lecture room is by windows placed high up in the main walls. Each of the laboratories has clearstory windows in the walls on the corridor side for cross ventilation and light. A good point on the ground plan is the single corridor which connects the girls' school with the science block and boys' school, serving assembly halls, classrooms, cloaks, &c., at the same time. The first floor faces due south, and occupies a position over the principal cloakrooms, comprising a large dining room seating 100 scholars, with kitchen, pantry, store, and assistant mistress's room. Future extension was indicated by single lines on the first-floor plan, showing accommodation for three classrooms, with desks for 30 girls in each room. These rooms are placed over the ground floor future extension. The principal light given to the classrooms is east and west, though the future extension shows four out of five classrooms with a north aspect. All the elevations were well designed, bands of dressed stone and angle quoins being used to the best advantage. Some decorative touches added interest, and broke up the monotony of repetition, which is such a common feature in school designs as a rule. The style adopted is of a quiet collegiate English character, with bits of detail suggestive of the Soane design for a town church won by the same architect a few years ago. Objection may be taken by the Board of Education to so many small squares shown in the windows, together with the mullions. A satisfactory compromise is possible without detracting from the appearance of the elevations. The draughtsmanship displayed by this design was excellent. The assessor estimates the cost of this scheme at £37 per head, and recommends the erection of the girls' and boys' school at the same period. He suggests that the science block should be of two storeys instead of one, and that the girls' school should be built further down the site than is shown on the block plan, so as to leave more space for hockey.

Design placed Second.

This position, with premium of £20, has been won by Messrs. Clark & Moscrop, of Darlington. In general arrangement and disposition on the site, this design follows the same lines as the first-premiated. Against the scheme as a whole is the shape of the girls' assembly hall, which is badly proportioned, being 32ft. 6ins. by 35ft. 6ins. Two classrooms have a north aspect. The changing rooms would be better separated from the cloak-room by a screen and division doors instead of a solid wall. This would assist the change of air, ventilation and the supervision. All the girls' latrines are too much under cover and awkwardly placed, lacking in convenience and cross ventilation. In the science block the preparation and balance-rooms adjoin the lecture-room, but the laboratories have no preparation rooms, being situated on the opposite side of the corridor. The dining-room arrangements on the first floor have not been carefully considered, having a cramped appearance. No communication is possible between the kitchen and dining-room, except by a small window hatch. Serving space and counter has been overlooked, and the scholars are wrongly seated in very long rows. The staircase is awkwardly placed and narrow for 100 scholars, and has an apology for a landing at the top of a long flight: the entrance door breaks into the dining-room with this same landing in an unsatisfactory way. In design the leading features of the elevations are disjointed, and some of the gable copings are treated with displeasing curves and angles of a commonplace type.

Design placed Third.

The set awarded this position, with premium of £10, was submitted by Messrs. Herbert T. Buckland and E. Haywood-Farmer, of Birmingham. A well-arranged block plan showed the position allotted to the boys' and girls' schools, which had a commendable feature in the shape of a fine court surrounded by buildings on three sides, with two main entrances and carriage-way in almost the orthodox college manner. The cost of this fine scheme was against it, otherwise it would have secured a higher position. It was noticeable on the plans that the same objectionable mistakes had been repeated as were illustrated in the Barnsley Secondary School competition, in which Messrs. Buckland & Farmer were placed first, particularly the conveniences, which are not disconnected in a proper way, and the want of light in the main corridor. Between the lay out of the grounds and the position of the buildings this scheme occupies more land than could be spared without seriously encroaching on the Grammar School cricket field. In design the exterior treatment was somewhat severe and heavy for a country district; but was preferable to the second-placed design. Refined draughtsmanship and neat printing completed a well-got-up set of drawings.

The churches of Annesley and Kirkby, near Nottingham, which were destroyed by fire a short time ago, are to be rebuilt. It is estimated that the cost of rebuilding Kirkby will exceed £7,000.

A NEW COMPETITION FOR READERS

As announced in our issue for last week, with the object of adding still more to the interest which is being taken in our "Architectural Dis-Orders Competition" we offer a prize of one guinea for the best two sketches for inclusion in the series. The drawings must be in ink, with no wash about them, and about double the size of the reproduction. They must be sent in by May 2nd, with the name and address of the sender written on the back of each. We reserve the right to use any of them.

EARLESTOWN FREE LIBRARY COMPETITION.

The Urban District Council of Newton-in-Makerfield have accepted, in competition, the design for the above library submitted by Mr. J. Myrtle Smith, A.R.I.B.A., of Chelsea. About 105 sets of drawings were received. The assessor appointed by the Council was Mr. Arthur Hope, of Bolton. The designs are open to public inspection at the Town Hall, Earlestown, during this week. In making his award, the assessor has carefully considered the schemes which provided sufficient accommodation to meet the requirements of the borough and in proportion to the population. The cost of the various schemes has also determined the selection to a great extent, many clever designs having had to be cast aside owing to the large cubical contents, coupled with expensive elevations. The result of the competition may be considered satisfactory. The standard of excellence shown by the plans and exterior treatment was not so high as in the Failsworth Library competition, dealt with in our issue for last week, but the accepted design is much superior—particularly in the elevations. No special accommodation was asked for; only the sum of money at the disposal of the Council was stated, and a brief explanatory note regarding the site, fees, &c., accompanied the site plan sent to all competitors.

The design placed first (see centre plate in this issue) is commendable in every respect. All the public accommodation is provided on the ground floor, with heating chamber, stores and coals in the basement. Ample supervision is allowed for, and the position of the reading-room is a strong point, as no direct window light could be obtained on one side of the site owing to a new technical school coming flush up to the boundary line. The library elevations had also to harmonise with this school. The shape of the lecture-room or children's library does not look successful. This room might also be better supervised if the wall directly opposite the lending department door had a borrowed light to assist the supervision. The accepted design was illustrated by a well-coloured perspective, and a cleverly drawn ½in. detail completed the set, which, as a whole, is one of the best designs for a small library that has been seen for some time. The estimated cost of the building is £3,448.

The design placed second was submitted by Messrs. Butterworth & Duncan, of Rochdale. Their plans are well arranged, but the lecture-hall on the first floor added so much to the cubical contents that the price per cubic foot was too low in comparison with the cost of other libraries to be seriously considered.

Notes on Competitions

Elementary School, Wimbledon.

172 architects sent in their names as desirous of competing for the new Council school to be erected in Pelham Road, South Wimbledon, for 1,000 children. Last week a meeting of the Wimbledon Borough Education Committee was held, when it was decided to invite the following fifteen architects to submit designs:—Messrs. Maurice B. Adams, H. O. Creswell, Alfred W. S. Cross, H. P. Burke-Downing, J. S. Gibson, G. E. T. Laurence, Arnold Mitchell, A. N. Prentice, Russell & Cooper, A. H. Ryan-Tenison, A. Saxon Snell, Thomson & Pomeroy, C. Harrison Townsend, Wills & Anderson, and W. G. Wilson. The assessor is John W. Simpson, F.R.I.B.A.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
April 30	LIBRARY AT WEDNESBURY.—Limited to architects within a 50 miles radius of Wednesbury. Premiums of £50, £30 and £20. Particulars from Thomas Jones, town clerk, Wednesbury.
May 7	ELEMENTARY SCHOOL AT HADFIELD, GLOSSOP.—(For 300 children). Architect placed first to be entrusted with the work: second premium of £20. Limited to architects practising within 30 miles of Glossop. Conditions from J. Walkden, Secretary to Education Committee, Howard Chambers, Glossop. Deposit, One guinea,
May 11	SCOTTISH NATIONAL EXHIBITION AT EDINBURGH. — Premiums of £100 and £75. Conditions from J. Marchbank, 45 York Place, Edinburgh, Deposit, One guinea.
May 17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable it conditions sent back within a fortnight, in the event of the architect deciding not to compete.
No date.	NEW MUNICIPAL OFFICES, &c. AT BETHNAL GREEN. — Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas.

Correspondence.

The Ordnance Survey.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—In supplement to the article on the Ordnance Survey, by Mr. Harold Slicer, in your issue for April 3rd, the following facts may be given:—

The Ordnance Survey is now under the Board of Agriculture, but as the work was originated in the first place by officers of the Royal Engineers, under the Board of Ordnance, and is still carried on by officers and men of that splendid corps, at Southampton, it remains a semi-military institution. The Survey was begun for military purposes in 1747, but it was not until 1783 that the great base was measured and the trigonometrical survey commenced.

The Board of Ordnance was abolished in 1855, and then the direction of the work was placed under the War Office. In 1870 it was transferred to the Board of Works, and finally to the Board of Agriculture and Fisheries in 1890.—Yours truly,

WOOLWICH. H. T. K. MOIR.

Notes and News

Glasgow Institute of Architects.—At last week's meeting Mr. James M. Monro, F.R.I.B.A., was re-elected president, Mr. George Bell vice-president, and Mr. C. J. MacLean secretary and treasurer.

The Buildings of the Irish International Exhibition, at Dublin, have been erected by Messrs. Humphreys, Ltd., of London and Dublin, Messrs. Kaye-Parry and Ross being the consulting architects.

New Headquarters for the Society for the Propagation of the Gospel are to be erected at the corner of Wood Street and Tufton Street, Westminster, at a cost of £34,000. The foundation-stone will be laid by the Prince and Princess of Wales on April 27th. Sir William Emerson is the architect of the building.

The cleaning and redecorating of the British Museum Reading Room has been placed in the hands of Messrs. Waring and Gillow, who hope to complete the work in 4½ or 5 months. An elaborate scaffolding is being built up from the floor to the top of the dome. Perhaps the most protracted work will be the regilding of the ironwork.

Covering Flat Concrete Roofs.—The Ruberoid Co., Ltd., have secured a large contract for the supply and laying of "Ruberoid" sheet roofing for covering the flat concrete roofs of the new Empire Theatre at Sunderland, now being erected. The roofs are of large extent, for 12,000 yards super of "Ruberoid" will be required.

Society of Ordained Surveyors.—The report of the council for the past session states that the draft modes of measurement for minor trades, after having been fully discussed and amended by the members at several special general meetings, were remitted to a committee to be revised and completed, and afterwards submitted to the Society for the final approval of the members before printing. The draft "table of fees" has now been printed and circulated.

The Martineau Memorial, Norwich.—This building, in memory of the late Dr. Martineau, is now in course of erection from designs by Mr. H. Chatfield Clarke, F.R.I.B.A., on a site in Colegate Street, adjacent to the Octagon Chapel. The ground floor is occupied by entrance hall, staircases, classrooms, and kitchen accommodation, and the first floor by a large lecture hall, and other classrooms. The estimated cost of the building is about £4,000. Messrs. Scarles Brothers, of Norwich, are the contractors.

The Fortis Green Reservoir, which forms part of the Metropolitan Water Board's Staines reservoirs communication works, was visited recently by the Junior Institution of Engineers, under the guidance of Mr. Joseph Francis, by whom the reservoir was designed, and under whose supervision it is being constructed by Mr. James Byron, the contractor. The capacity of the reservoir will be ten million gallons, and its depth 17ft. A central division wall, extending up to a level of 6ft. below the top-water line, will divide the reservoir into two equal parts below that level. The floor will be of concrete, the walls and piers of brickwork, and the roof of brick arching with concrete filling to the spandrels, and covered with asphalt.

SOCIETY OF ARCHITECTS.

Annual Dinner.

The twenty-third annual dinner of the Society of Architects was held on Thursday evening last at De Keyser's Royal Hotel. The chair was occupied by the president, Mr. A. E. Pridmore, who was supported by the Lord Mayor of London (Sir William Treloar), Lord Monkswell, Sheriffs Crosby and Dunn, Sir Benjamin Stone, M.P., Captain Fitzroy Hemphill, Judge Rentoul, Mr. L. A. Atherley Jones, K.C., M.P., Mr. T. B. Silcock, M.P., the Mayor of Bath, Sir Henry Trueman Wood, Mr. W. E. Riley (superintending architect, L.C.C.), Professor R. Elsey Smith, the mayors of several metropolitan boroughs and a large number of architects and surveyors.

After the Royal toasts had been given, Mr. Deputy Wallace proposed "The Houses of Parliament," the toast being responded to by Lord Monkswell and Mr. T. B. Silcock. Judge Rentoul then proposed "The Local Authorities," making in the course of his speech some humorous remarks about the acoustics of the courts in the new "Old Bailey." He said that the court in which he sat presented the remarkable phenomenon of a man hearing himself speak, and then hearing another man uttering exactly the same thing; the difficulty of carrying on conversation under such conditions had thus led to the suggestion that counsel should be connected to the judicial bench by speaking tubes! Sheriff Crosby, however, who replied on behalf of the Lord Mayor, said that his experience of court No. 1 was quite different, the acoustics of that court being excellent. Captain Fitzroy Hemphill (deputy chairman of the L.C.C., and chairman of the Building Act Committee) also responded to this toast. He cited the great opportunities which architects had in connection with the two great London improvements—namely, the rebuilding of Regent Street and the creation of Kingsway. With regard to the former he hoped that the critics of Mr. Shaw's design would not be listened to by members of the architectural profession; they all knew the effect of great masses of structure supported on glass—hideous and hopeless from the architectural point of view—and this was not to be accepted for the new London.

The Mayor of Bath (Councillor Sidney W. Bush) also responded to this toast, recalling to mind the need for the cultivation of taste in connection with civic expansion, and instancing the beautiful architecture of the Woods at Bath as an example of what might be done.

The toast of "The Society of Architects" was proposed by Mr. L. A. Atherley Jones, K.C., M.P., who referred to the society's Registration Bill. He regretted that it had not made the progress in Parliament which it deserved. The monopoly of time by the Government had resulted in a large number of useful measures being shelved; they were formally introduced, they got printed, and they passed then into limbo. The Society's Bill, which had been brought forward year after year, was somewhat in this predicament; but he thought there was a healthier state of opinion with regard to it in Parliament, and he suggested the process of "lobbying."

The president, who responded to the toast, said that it was twenty-three years since a small body of architects had gathered together with the object of securing statutory recognition and the improvement of architectural education. The Society, then inaugurated, had now 900 members, and it had kept constantly in view the objects which it had been founded to secure. With regard to registration, as opportunity occurred Mr. Atherley Jones would re-introduce the Bill into Parliament, for they were determined to continue in their attempt to get the measure on the statute book. The Bill was not a selfish one, but intended to benefit both the profession and the community.

The last toast was that of "The Visitors," which was proposed by Mr. G. A. T. Middleton, A.R.I.B.A. (vice-president of the Society), and responded to by Sir H. Trueman Wood and Mr. A. A. Hudson.

THE BUILDING TRADES' EXHIBITION.

The Prince and Princess of Wales visited the exhibition on Tuesday afternoon last week, and made an extended inspection of the various exhibits. Their Royal Highnesses showed considerable interest in the various stalls, especially in the exhibits of joinery and fireplaces, and new inventions in sanitary appliances. After a complete tour of the main hall, their Royal Highnesses were taken up to the gallery by means of the Waygood lift, Mr. H. C. Walker, chairman of Messrs. Waygood and Co., being introduced to the Prince by Mr. Montgomery.

Patent Indented Steel Bar.

We have already referred in former issues to the interesting stand of the Patent Indented Steel Bar Co., and we now give a photograph of this. The view clearly shows the specially constructed case which was arranged in the centre displaying about 60 photographs of reinforced concrete structures in different parts of the world in which "indented bars" have been used. These photographs were transparent and lighted from behind. A number of models were arranged round the stand, illustrating the construction of reservoirs, sewers, retaining walls, tunnels, culverts, bridges, beams, &c. Bent over the stand were some large-section "indented bars."

A Patent Chimney Pot.

In our notice of the exhibit of Messrs. Mark Fawcett & Co., of 50, Queen Anne's Gate, Westminster, we were compelled by want of space to omit reference to the interesting show of the patent "Edwardian" down-draught-preventing chimney pot. Examples in plain red clay and buff and salt glazed fire-clay were shown. The shape of the pot is undoubtedly greatly superior to the ordinary type of down-draught-preventing chimney pots. It has a cover, dished on the top, supported on four legs which are given considerable taper and entasis, thus improving their appearance greatly. The height of the pot is about 24ins. with an outside diameter of 13¼ins. at the bottom, and 12½ins. at the top. The top edge of the cover has been slightly rounded, and a drip formed in the soffit. The dished cover acts like an umbrella, preventing the flue from becoming damp, while the soffit allows the smoke and hot air to come out on all four sides when there is little wind, but when a strong or descending wind is blowing the smoke and hot air come out on the leeward side, and are drawn upwards on this side by the wind blowing across or down from the windward side of the pot and following the curve of the dish. Briefly, the dish-shaped cover causes an up-draught which assists in drawing out the smoke. The pot has been in use for over a year, and has given uniformly successful results in difficult conditions.

£45,000 for Workmen's Dwellings.—The Hornsey Town Council has adopted a scheme (prepared by Mr. E. J. Lovegrove, the borough engineer and surveyor) for the erection of 120 additional workmen's dwellings at Highgate, upon land secured from the Ecclesiastical Commissioners. The estimated capital expenditure for the erection of the cottages, draining, fencing, and laying-out and sewering the roads is £39,690, to which must be added £5,700, the cost of the land, making a total of £45,390.

THE EXHIBIT OF THE PATENT INDENTED STEEL BAR CO., LTD., AT THE BUILDING TRADES' EXHIBITION.

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Belfast.—For building additions and alterations to Salem Methodist Church in York Street. Mr. W. D. R. Taggart, architect, 2, Wellington Place, Belfast :—

McIntyre Brothers	£3,683	6	3
McDowell, Leatham & Fraser	3,678	16	6
R. Calwell	3,620	17	11
C. & J. McQuoid	3,543	8	8
J. Lees	3,439	0	0
J. & R. Thompson	3,190	0	0
W. J. Campbell & Son	3,169	5	1
Lowry & Percy	3,137	0	0
H. Keith	3,055	0	0
J. Kidd	3,019	13	7
W. Dowling	2,786	15	3
J. Elliott	2,541	0	0
I. Copeland*	2,368	0	0

* Accepted.
All of Belfast.

Brighton.—For the erection of new buildings for the Junior House School, for the Roedean (Junior House) School Site and Buildings, Ltd. Messrs. John W. Simpson and Maxwell Ayrton, architects, Gray's Inn, W.C. Quantities by Messrs. G. M. Simpson and Norman Evill :—

H. J. Penfold, Brighton	£18,960
G. H. Denne & Son, Deal	18,867
Potters Brothers, Horsham	18,130
James Longley & Co., Crawley	17,448
Walter Holt & Sons, Croydon	17,200
J. Parnell & Son, Rugby	17,162
Wm. Johnson & Co., Ltd., London	16,990
James Barnes & Sons, Brighton	16,976
E. Lawrance & Sons, London	16,885
W. H. Lorden & Son,* London	16,789
Patman & Fotheringham, Ltd., London	16,563
W. S. Shepherd & Co., London	16,464
Henry Flint, High Wycombe	16,147
Wm. F. Blay, Dartford	16,000
Stevens, Bastow & Co., Ltd., Bristol	15,996
Richard Cook & Sons, Crawley	15,985
F. G. Minter, London	15,977

* Tender irregular.

Earlestown (Lancs.).—Accepted for the erection of two settings of through retorts (32 mouthpieces), with alterations to retort-house, for the Newton-in-Makerfield U.D.C. :—

Drakes, Ltd., Halifax	£1,875

Hertford.—For new form rooms and dormitory annexes at Haileybury College. Messrs. John W. Simpson and Maxwell Ayrton architects, Gray's Inn, W.C. Quantities by Messrs. G. M. Simpson and Norman Evill :—

Rudd & Sons, Ltd., Grantham	£23,546	7	9
W. J. Bloxham, Banbury	22,906	0	0
A. Estcourt & Sons, Gloucester	22,803	0	0
Wm. Bell & Sons, Saffron Walden	22,491	0	0
J. Jarvis & Sons, London	21,790	0	0
E. Lawrance & Sons, London	21,741	0	0
H. Norris & Sons, Hertford	21,711	0	0
Wm. Johnson & Co., Ltd., London	21,703	0	0
Stevens, Bastow & Co., Ltd., Bristol	21,690	0	0
W. Holt & Sons, Croydon	21,672	0	0
Thos. Lowe & Sons, Burton-on-Trent	21,650	0	0
McCormick & Sons, London	21,369	0	0
Ekins & Co., Ltd., Hertford	21,153	10	8
Sabey & Son, Ltd., London	21,145	0	0
J. Parnell & Son, Rugby	21,114	0	0
John Cracknell, Peterborough	21,110	16	5
W. S. Shepherd & Co., London	21,029	0	0
J. A. Hunt, Hoddesdon	21,012	0	0
E. Brown & Son, Ltd., Wellingborough	20,487	0	0
Chas. Brightman, Watford	20,114	0	0
Fairhead, Allen & Son, Enfield	20,020	0	0

London, N.E.—For the erection of special school and manual training centre at Mowlem Street, Bethnal Green, for the London County Council. Mr. T. J. Bailey, architect (Education) :—

A. Porter, Tottenham	£5,577
G. S. S. Williams & Son, Thornhill Square	4,210
J. Willmott & Sons, Hitchin	4,108
Killby & Gayford, Ltd., 87, Worship Street	4,061
Perry & Co., Bow	4,037
E. Lawrance & Sons, City Road	3,967
J. Chessum & Sons, Bow	3,918
A. E. Symes, Stratford	3,909
W. Lawrence & Son,* Waltham Cross	3,564

* Recommended for acceptance.
Architect's estimate, £3,950.

Newport, Mon.—For the erection of new shops, offices, &c., in High Street, for Messrs. Davies & Sons. Messrs. Habershon, Fawckner & Co., architects, 41, High Street, Newport, and Cardiff :—

J. Dean & Son	£5,900
W. T. Case	5,754
W. Moore	5,650
E. G. Clarke	5,543
J. Brownscombe & Son	5,499
J. J. Partridge	5,425
G. F. Leadbeater	5,387
J. H. Leadbeater	5,297
Poulton & Whiting, Pontnewydd	5,230
A. S. Moran & Co.	5,227
W. King & Son, Westminster	5,198
W. M. Blackburn	5,159
John Matthias	5,120
John Charles	5,110
F. W. Powells	5,069
W. A. Linton	5,046
R. W. Moon	4,997
W. E. Blake, Plymouth	4,939
J. H. Williams	4,749
C. H. Reed	4,745
W. Jewell & Sons*	4,600
E. C. Jordan & Son	4,570

* Accepted.

Sunbury (Middlesex).—Accepted for the erection of new "Metaxin" works at Sunbury Common, for Messrs. Wallpaper Manufacturers, Ltd., Lincrusta Walton Branch. Mr. H. Reginald Coales, A.R.I.B.A., architect, Leatherhead and Sunbury :—

G. Darlington, Amersham	£2,350

Coming Events.

Wednesday, April 24.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Annual business meeting and President's address on "Holyrood Chapel—As It Is," at 7.30 p.m.

ROYAL SANITARY INSTITUTE.—Inspection and demonstration at the East London Waterworks, Lea Bridge, Clapton, at 3 p.m.

Thursday, April 25.

INSTITUTION OF MECHANICAL ENGINEERS.—President's address, at 8 p.m.

Friday, April 26.

ARCHITECTURAL ASSOCIATION.—Mr. F. W. Simon, F.R.I.B.A., on "Liverpool Architecture," at 7.30 p.m.

INSTITUTE OF SANITARY ENGINEERS.—Dr. J. Priestley on "Sanitary Law," at 7 p.m.

Saturday, April 27.

INSTITUTE OF SANITARY ENGINEERS.—Examination Committee at 5.30 p.m.; Election Committee at 6.30 p.m.; Mr. P. M. Fraser, A.R.I.B.A., and Mr. A. A. H. Scott, M.S.A., on "A Short History of Building Materials," at 8 p.m.

Wednesday, May 1.

INSTITUTE OF SANITARY ENGINEERS.—Mr. N. W. Hoskins on "The Science of the Air with Respect to Ventilation," at 8 p.m.

Saturday, May 4.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Associates' visit to William Turner & Sons' stone dressing works.

ROYAL SANITARY INSTITUTE.—Inspection and demonstration at the Sewage Outfall Works, Barking, at 3 p.m.

Monday, May 6.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.—Annual general meeting, at 8 p.m.

Saturday, May 11.

NORTHERN ARCHITECTURAL ASSOCIATION.—Visit to Newcastle.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Visit to The Peel, Clovenfords.

Tuesday, May 21.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Associates' visit to Glasgow.

Saturday, May 25.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Visit to Dalkeith Palace and Chapel.

Monday, May 27.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.—Meeting at 8 p.m.

Tuesday, May 28.

ARCHITECTURAL ASSOCIATION OF IRELAND.—President's valedictory address; election of officers for session 1907-1908.

Bankruptcies.

DURING THE WEEK ending April 19th twenty failures in the building and timber trades in England and Wales were gazetted.

R. H. MARTIN, builder, Plymouth. R.O., April 11.

R. BLACK, builder and contractor, Bedford. R.O., April 13.

C. J. WELTON, builder, Ripley. Liabilities, £629; deficiency, £57.

TRACE BROTHERS, painters and decorators, Gloucester. R.O., April 13.

H. STUART, builder, London. P.E., Bankruptcy Court, May 14, at 11. R.O., April 8.

W. SQUIRES, architect, Pannal. Liabilities, £1,375; assets estimated at £2,909; surplus, £1,534.

W. F. & L. PRICE, builders, Aberdare. Gross liabilities, £9,950; assets estimated at £596; deficiency, £5,654.

J. GOODENOUGH, builder, Cowes. First meeting, O.R.'s, Newport, April 27, at 1. P.E., Town Hall, Newport, April 27, at 3.15.

W. E. HUNTER, builder, Hull. Gross liabilities, £14,357; expected to rank for dividend, £362; assets, £1,164; surplus, £802.

J. E. TURNER, builder, Walmer. First meeting, O.R.'s, Canterbury, April 25, at 11.45. P.E., Guildhall, Canterbury, April 25, at 10.

W. WORSFOLD, builder, Eastbourne. First meeting, C.C., Eastbourne, April 30, at 2. P.E., Town Hall, Eastbourne, April 30, at 2.30.

F. STONE, builder & contractor, Brislington. First meeting, O.R.'s, Bristol, April 24, at 11.30. P.E., Guildhall, Bristol, May 10, at 12.

F. J. ATWELL, builder, Walthamstow. First meeting, London Bankruptcy Court, April 26, at 11. P.E., same, May 29, at 11. R.O., April 8.

T. HINES, builder, Caerphilly. First meeting, Post-office Chambers, Pontypridd, April 30, at 2.30. P.E., Pontypridd C.C., April 30, at 10.15.

New London Buildings

At yesterday's meeting of the London County Council the Building Acts Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics* :—

Buildings on the eastern side of Latimer Road, Kensington, abutting also upon the northern side of Oxford Gardens, on the application of Trant, Brown & Humphreys, on behalf of Daley & Franklin. (*Consent.*)

Re-erection of South Kensington Station, abutting upon Pelham Street and Alfred Place West, Kensington, and in connection therewith the erection of lock-up shops abutting upon Pelham Street, on the application of G. Sherrin, on behalf of the Metropolitan and District Railway Companies. (*Consent.*)

Nine houses with porches, half timber work, barge boards and oriel windows on the western side of Hither Green Lane, Lewisham, on the application of H. Lewis Upham, on behalf of S. E. Wood. (*Consent.*)

Re-erection of No. 39, Great Windmill Street, Westminster, on the application of E. H. Selby, on behalf of C. Sharland. (*Consent.*)

Additions to St. Mary's School, West End Lane, Hampstead, on the application of Beazley & Burrows, on behalf of the Managers of the School. (*Refusal.*)

Additions to St. Andrew's Mission Hall, Hazlewood Crescent, Kensington, on the application of E. H. Bullock on behalf of the Rev. S. W. Langsford. (*Refusal.*)

Building on the south-western side of Lloyd's Avenue, Fenchurch Street, City, to exceed in height the width of the street, in connection with the application of Holland & Hannen. (*Consent.*)

New Companies.

G. JACKSON & SONS, to acquire the business carried on at Rathbone Place, W., as George Jackson & Sons, and to carry on the business of manufacturers of and dealers in composition, plaster, papier maché, carton pierre paper, mantelpieces, decorations, &c. Capital: £66,000.

HAMILTON BUILDING MATERIAL AND CEMENT CO., 61 and 61a, Breckfield Road North, Liverpool. Capital: £3,000.

E. FISHER & CO., builders, contractors, carpenters, &c., 48, Louisa Street, Docks, Cardiff. Capital: £500.

BOULTON & CO. (LONGPORT), to acquire the business of brick and tile manufacturers carried on by W. Boulton at Port Vale, Wolstanton, Staffs, as "Boulton & Co." Capital: £20,000.

A Municipal Sanatorium is to be provided on the Cotswold Hills at a cost of £17,000 by the Birmingham City Council. No new building is to be erected, however, but an existing mansion reconstructed and shelters built.

New Ophthalmic Wards have been erected at the Royal Hospital, Richmond, Surrey, at a cost of about £4,000. The department includes a six-bed ward for men, and another for women, a small operating theatre, and the necessary accommodation for the nursing staff.

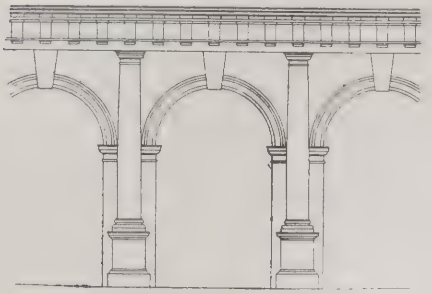
A new Post-Office at Aberdeen has been erected facing Crown Street, at a cost of about £50,000. The designs were prepared in H.M. Office of Works, under the direction of Mr. W. W. Robertson, late H.M. Principal Architect for Scotland. The general contractors were Messrs. Peter Bisset and Sons, of Aberdeen.

A new tennis court has been built for the Hon. Neville S. Lytton at Crabbet Park, Three Bridges, Sussex, under the direction of a well-known expert, Mr. Joseph Bickley. The floor of the court is red (a colour which has seemed to work most successfully in several tennis and racquet courts built lately) while the chases are marked in black. The walls are black, the net post and columns red, to match the floor, the bandeau is of a rather deeper red, and the top of the pent-house dark green.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Twelfth Series.)

CLASS A (ARCHITECTURE).



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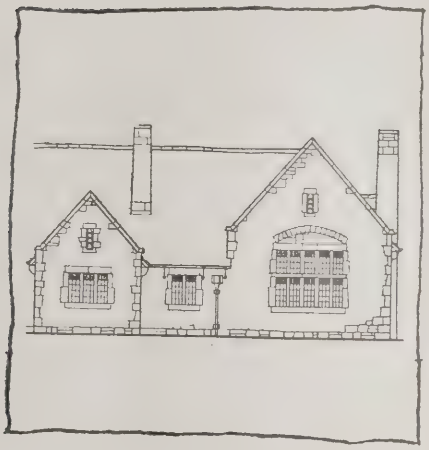

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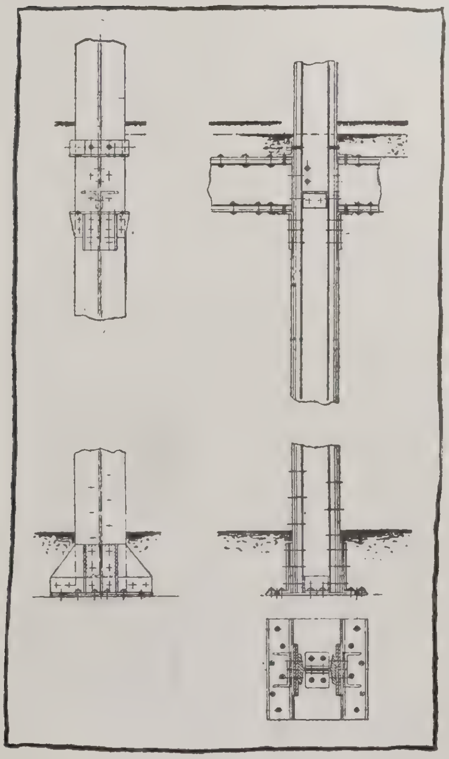

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This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

10. Any violation of these rules will entail disqualification.

11. The Editor's decision on every matter will be final

Particulars of a new competition in connection with this "Architectural Dis-Orders Competition" will be found on p. 207 of this issue.

(For Coupons see page iv.)

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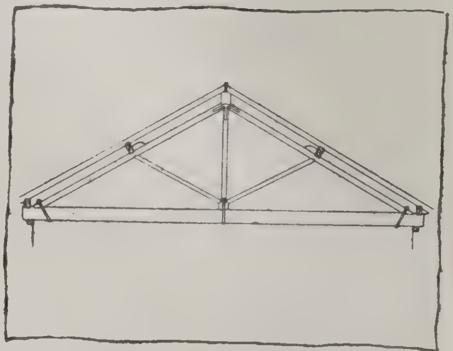
*Copies of "*THE BUILDERS' JOURNAL*" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

CLASS B (BUILDING).



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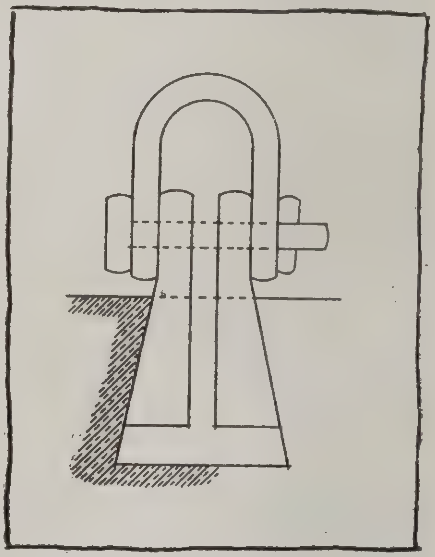

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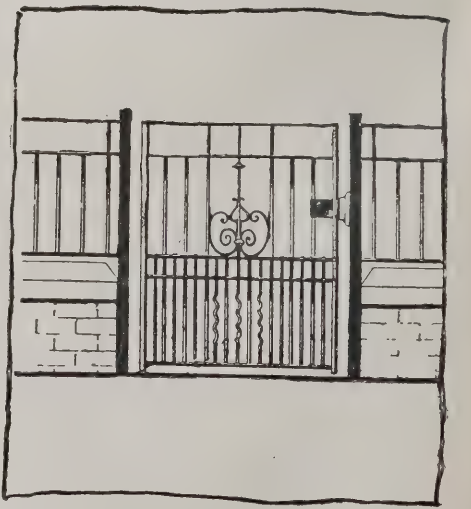

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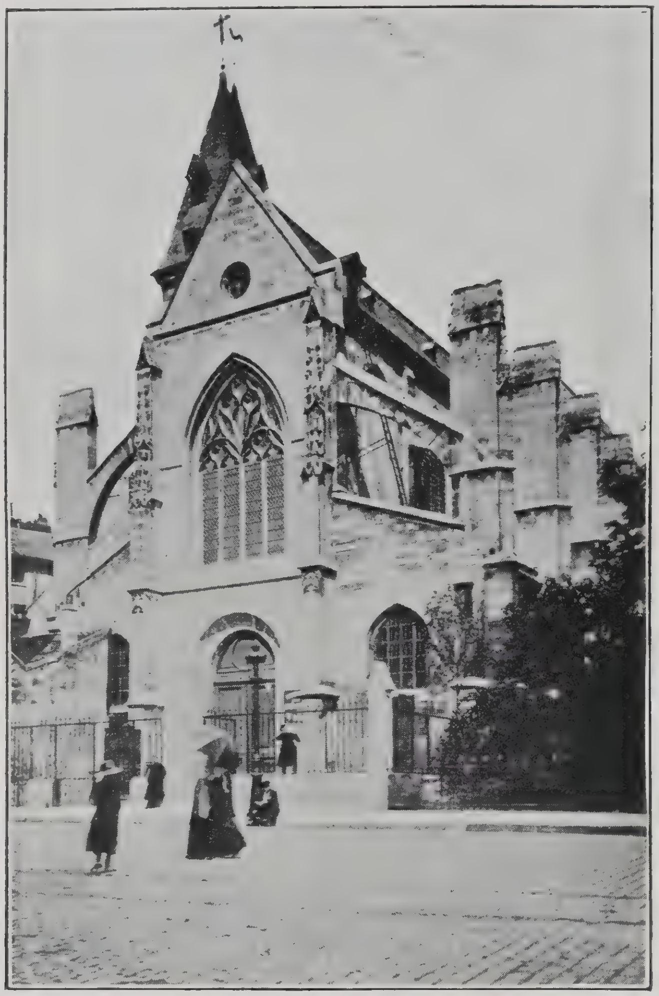
Wednesday, May 1st, 1907.



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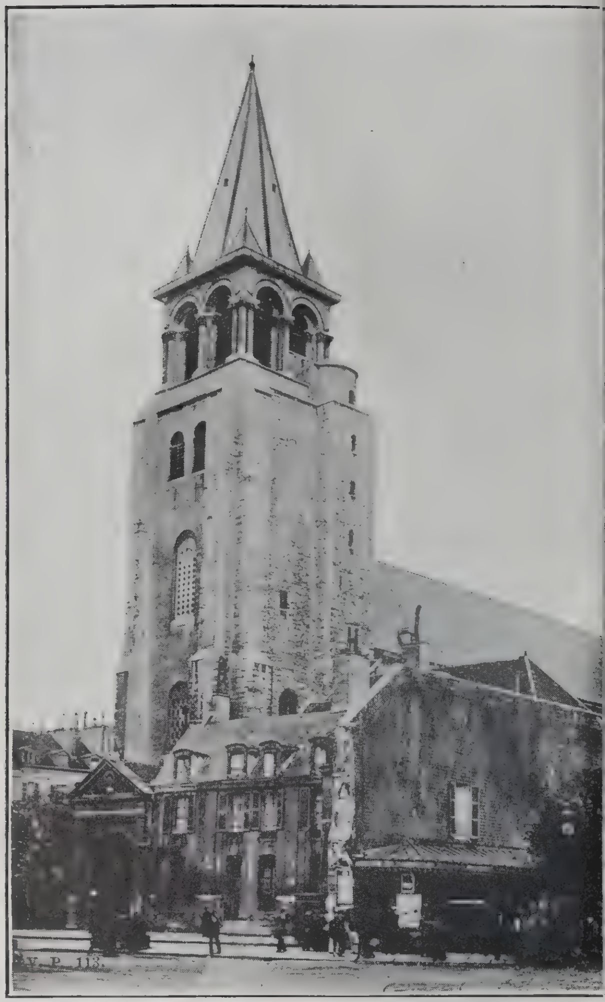

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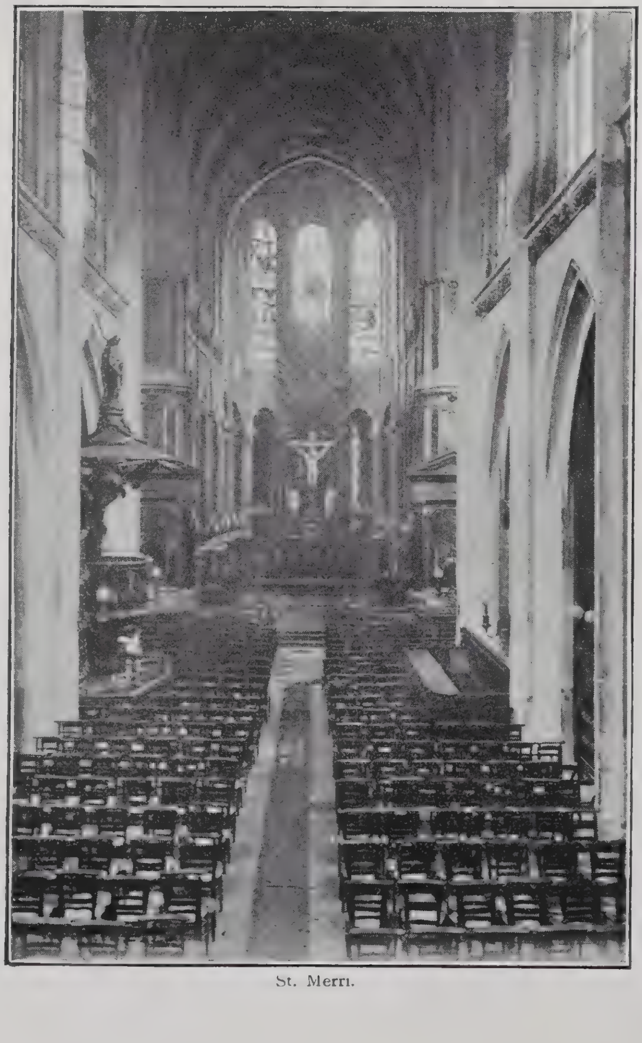

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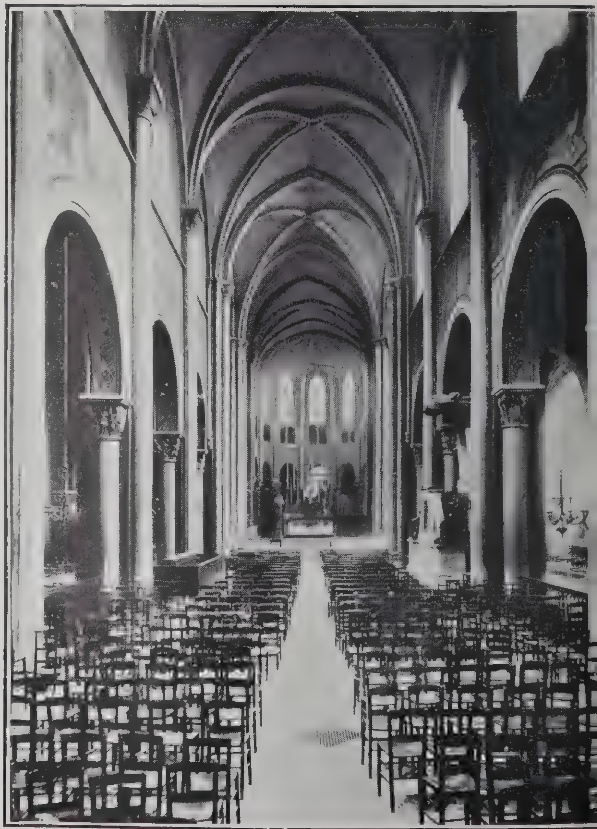

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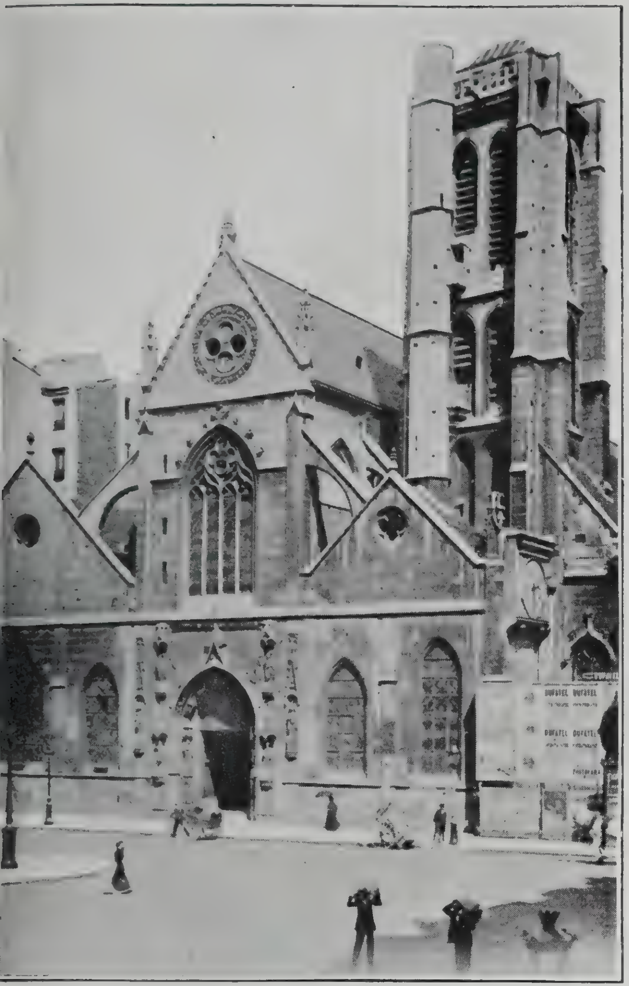

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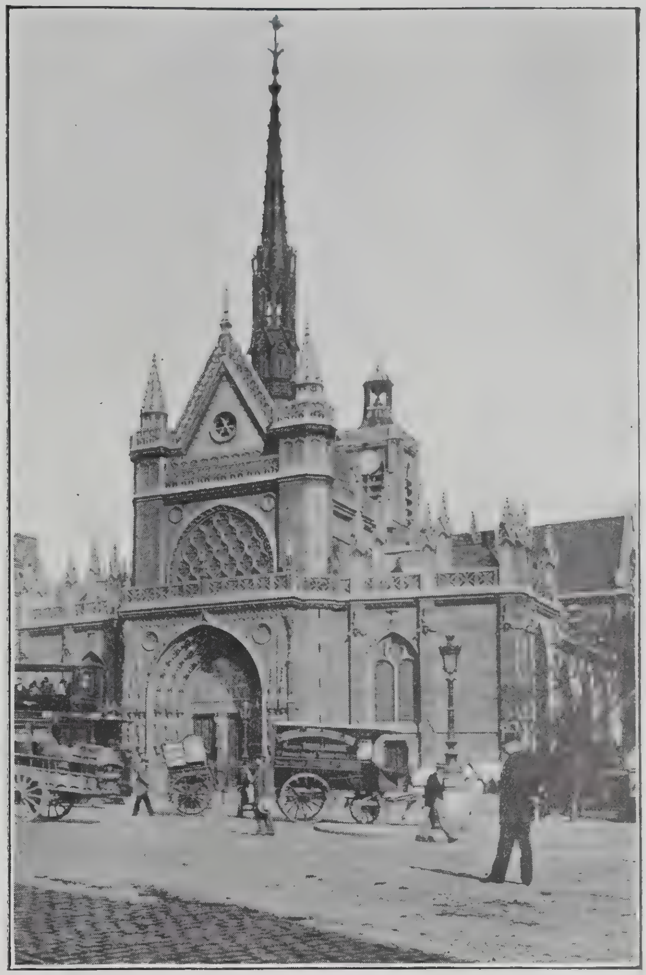

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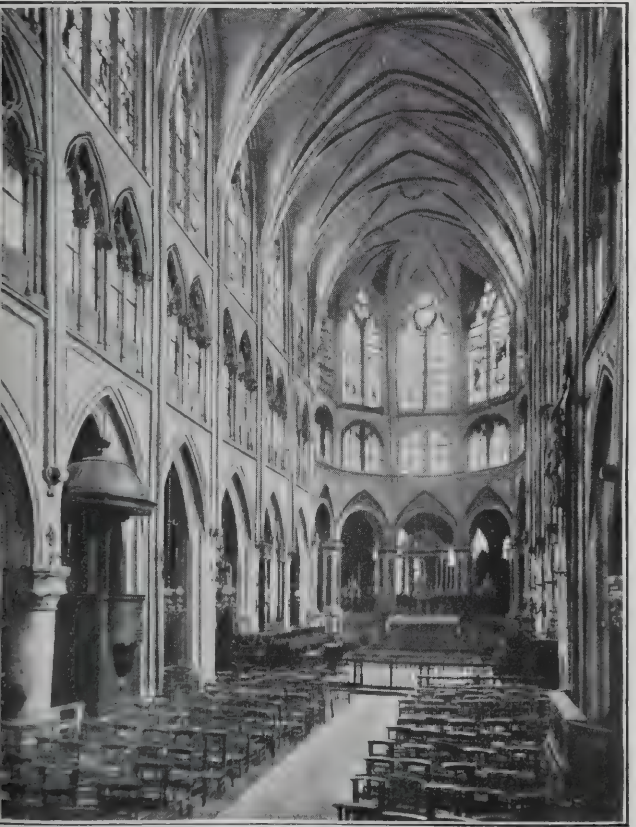

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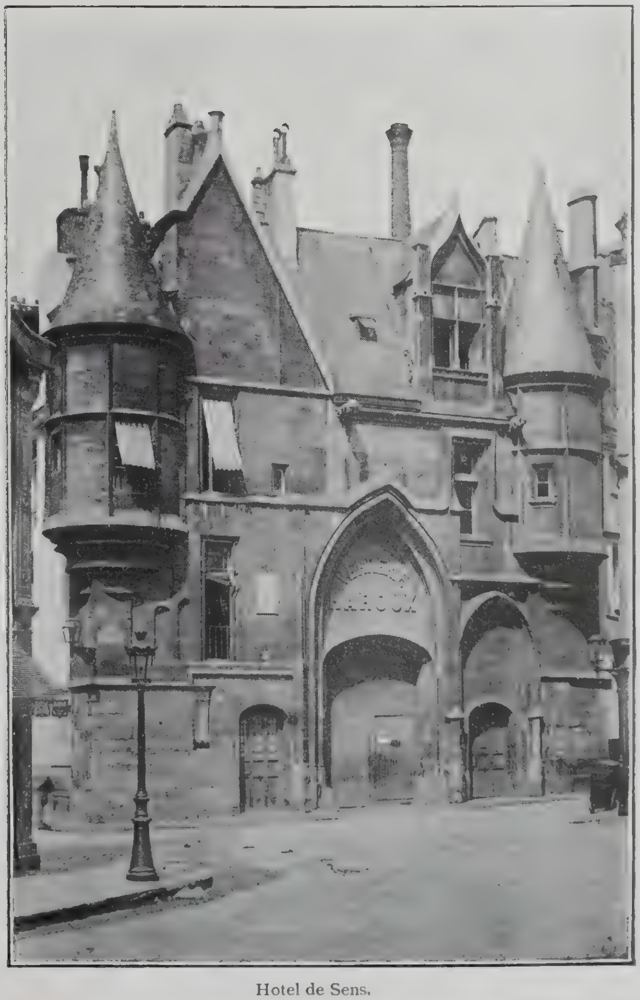

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May 1, 1907. Volume 25, No. 638

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

Notices.

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The **"Contractors' Supplement"** is given in this issue.

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St. Paul's. During the past week a statement has appeared in the public press that the Main Drainage Committee of the London County Council have decided to recommend that the route of the new sewer which was to have passed near the south-west tower of St. Paul's Cathedral should be altered, so as to pass along Thames Street, diverting the sewer from the first proposed line at Bridge Street. The next step will be a conference of the Main Drainage and Finance Committees in order to arrange for any possible claims which might arise in connection with the proposed new route. This will necessitate negotiations, so that a little time must elapse before the Committee will be in a position to make a report to the Council, and so obtain a final official decision. Assuming this statement to be correct, the cathedral authorities and the advisory committee of architects (consisting of Sir Aston Webb, Mr. John Belcher, and Mr. T. E. Collcutt), as well as the public interested, have reason to congratulate themselves on the removal of a source of danger to the cathedral. No doubt the names of the three distinguished architects who constitute the advisory committee have had considerable weight with the London County Council, and the architect of St. Paul's, Mr. Mervyn E. Macartney, deserves every praise for engaging their assistance. It is fortunate that the cathedral has such watchful guardians, suspicious of every proposal likely to affect the fabric. Of course, the report of the advisory committee has not been officially made public as yet, although statements have appeared in the press; but we presume when it is available there will be recommendations as to what measures should be taken in order to prevent the continuance of the gradual subsidence of the foundations due to drawing-off of water from the subsoil. We have expressed our opinion that the foundations at the south-west corner should be underpinned, and we believe the engineers to the cathedral authorities are of a similar opinion, but the means by which this should be done, and the extent of any underpinning operations, would be best left in the hands of architects of such eminence as those who have charge of the matter. Our own view is that means should be taken once for all to safeguard the cathedral and render it thoroughly secure. It is well to avoid any patching up, which would be but a temporary measure.

A Building Court for London. In our issue for April 10th we published particulars of Mr. John W. Simpson's suggestion for a special Court in London to deal with building matters. Mr. Thomas E. Collcutt, as president of the Royal Institute of British Architects, has now written to "The Times" in support of Mr. Simpson's attitude. After referring to the difficulties, contradictions and ambiguities of the various Building Acts, with their numerous by-laws, schedules and regulations, he says: "The Council of the Royal Institute of British Architects are in cordial sympathy with the principle of the scheme so ably put forward by Mr. John W. Simpson; and they have appointed a special committee to enquire into the subject, to gather together information bearing upon it, and, if possible, to suggest the main principles governing the constitution of such a Court, in the hope that their labours will be of service to the whole community." All architects practising in London will be glad to hear that the Institute has thus come to the help of Mr. Simpson and other individual workers for the cause of reform in regulations and legal procedure appertaining to building.

New, True, or Neither

I am glad to observe that the sound good sense which has named slates after the ranks of the female aristocracy is being copied by the makers of joinery, who call their doors and windows by the names of their female relatives. In this connection it is interesting to quote from the specification used by an eminent architect, which may be studied with profit by students and others. It reads thus: "DOORS.—Gwendolens to be put in all the reception rooms, and Lilians in all bedrooms and bathrooms; fix Doras on front stairs, and hang Maudes at front entrance." As all the foregoing doors are of a thoroughly good class, the usual specification clause prohibiting improper joinery may be omitted.

* * *

The new invention for rendering drains water-tight after they have been covered in will bear hardly on certain small builders in the provinces, who are thus threatened with ruin and destitution. These unhappy men entirely subsist by taking up and relaying drains laid and relaid by each other.

* * *

We have not heard so much about "function" in architecture lately, and the expression of the building on the exterior. There is a limit even to all good things, and I do not recall any kitchen which is expressed on the exterior by frying-pans; but that only shows the loss of opportunity. Quite recently a well-known architect told how he had improved the shining hour (if such an expression may be passed when related to something that happened in the middle of the night) by making a sketch of a certain piece of ecclesiastical ornament in a Spanish monastery where he had been immured. The point is worth noting, especially by those architects who are likely to go to prison, where they can take advantage of the opportunity of getting some first-hand information that could be presented with much effect at an Association meeting. On Friday next Mr. —— will read a paper on "Cells, from the Architect's Point of View."

THE LOOKER-ON.

MEDIEVAL BUILDINGS IN PARIS.

By F. H. Cheetham.

There is no attempt in this article to describe any of the ancient buildings of Paris that yet remain. Its object is merely to indicate what these buildings are, where they are situated, and the chief points of interest which they have to offer to the architectural visitor. More detailed accounts of all the buildings here mentioned will be found in any good guide-book to Paris. But the information here brought together is necessarily so scattered in the guide-books that the visitor may not feel inclined to sift it for himself. It is assumed that the reader is desirous of seeing all that there is left of Gothic Paris, and that he is content for the present to pass by all buildings subsequent to the 16th century. In the following list only such buildings of the 16th century are included as may be classed as Gothic. There were a good many additions made to already existing Gothic buildings in this century, and much rebuilding, and this work, though overlapping in date with the Renaissance, is included in the present list. But such churches as St. Etienne-du-Mont and St. Eustache, though replacing older churches, and retaining something of Gothic form, are really new Renaissance buildings, and are therefore not included.

All visitors to Paris see Notre Dame, the Sainte Chapelle, and the Musée Cluny, and most of them in passing are aware of the existence of St. Germain-de-l'Auxerrois and the Tour St. Jacques, but over and above these five buildings the average tourist knows little or nothing of Medieval Paris. There are, however, at least half a dozen other old buildings which are well worth a visit, and three churches on the left bank (St. Germain-des-Prés, St. Severin, and St. Julien-le-Pauvre) which deserve special attention.

Paris had its beginnings on the island where Notre Dame and the Sainte Chapelle now stand. From this centre it spread north and south, on both sides of the river. The area of medieval buildings is therefore to be sought in the centre of the city, and the accompanying sketch plan will show at a glance how compact this area is. Roughly speaking it covers about three square miles, and may be said to have Notre Dame as its centre. The positions of two ancient walls of Paris are both shown on the plan. The older wall, that of Philippe Auguste, at the end of the 12th century enclosed an area of about two square miles. This wall was replaced on the north bank by Charles V. in the middle of the 14th century by a wall of greater circumference, the city having grown very rapidly on that side during the intervening years. It is within this area of the old walls, therefore, that Gothic buildings must be looked for, though the churches of St. Laurent, on the north, and St. Médard, on the south, are some distance from this central area. They represent ancient suburbs. The Abbey of St. Germain-des-Prés was also outside the walls.

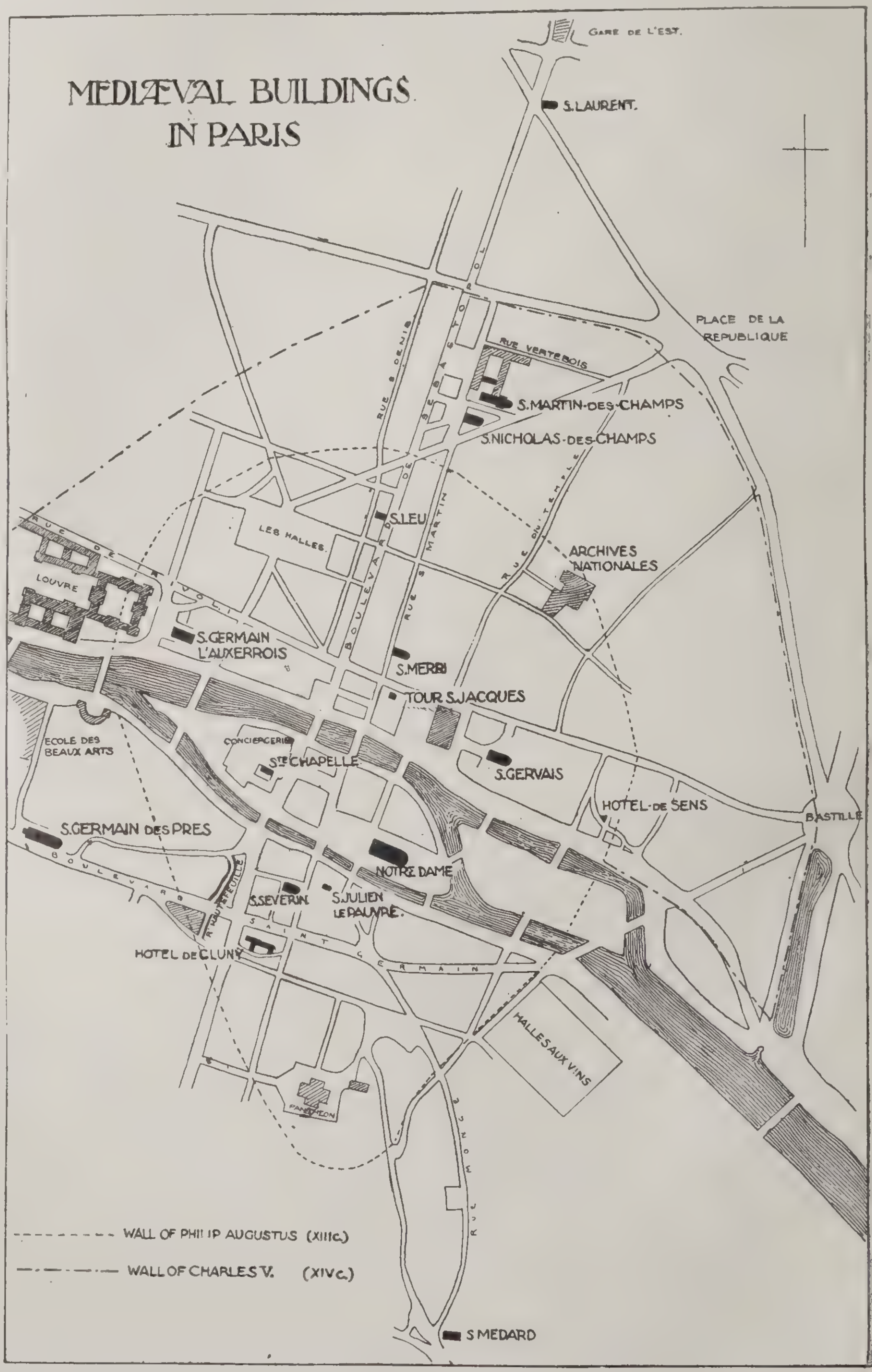
This area naturally falls into three parts —(1) The Island (Ile de la Cité); (2) the Left or south Bank; (3) the Right or north Bank. In dealing with each of these in turn we shall make no references to the many ancient buildings which formerly stood there, and whose sites are well known. For further handy information about ancient Paris buildings the reader is referred to the late Mr. Grant Allen's excellent guide, the books on Paris by Mr. P. G. Hamerton, Mr. Augustus Hare and Mr. Hilaire Belloc, to Miss Beale's "Churches of Paris," and, if he can procure a copy, to Guilhermy's "Itinéraire Archéologique."

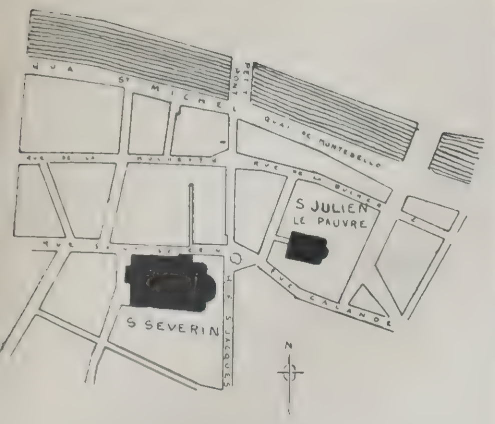
The Ile de la Cité.

On the Island was formerly the Royal Palace as well as the Courts of Justice and the cathedral. The Palais de Justice now occupies the site of the ancient "Palais de la Cité," and parts of the old building still remain in the Conciergerie. The cathedral, however, first claims the attention of the visitor to the Island.

Notre Dame.—The Cathedral of Paris is too well known to need any description. The following dates, as given by Enlart (Manuel d'Archéologie Française) will be useful;—First stone laid, 1163; consecration (choir), 1182; Portail Ste. Anne, 1175*c.*; nave finished (except last bays), 1196; west facade, 1208 to 1235; towers finished, 1245*c.*; transepts and south porch, 1257; chapels, 1290 to 1320. The volume on Notre Dame in Bell's "Continental Churches," by Mr. Charles Hiatt, will be found useful in viewing the cathedral. It is worth while to ascend the towers, both for the sake of examining the details and for the bird's-eye view of the city, by which one may distinguish the position of nearly all the old buildings mentioned in this list. Notre Dame was entirely restored in the middle of the last century under the direction of M. Duban, and afterwards of MM. Lassus and Viollet-le-Duc. The cathedral has been given a wide open space before and behind.

The Sainte Chapelle is also very well known. It stands in one of the courts of the Palais de Justice. The reason of this is that it was originally the chapel of the Royal Palace. The palace has gone, but the chapel remains. The upper floor was on the same level as the royal apartments and approached from





POSITION OF ST. SEVERIN AND ST. JULEIN LE PAUVRE.

them. The Sainte Chapelle was built by Louis IX. to receive the relics he brought back with him from Constantinople. It is of two storeys and is the work of Pierre de Montereau, having been built between 1242 and 1248. The west front was added in the 15th century, but harmonises extremely well with the earlier work. The restoration of the chapel was begun in 1837 under the direction of M. Duban, with MM. Lassus and Viollet-le-Duc as assistants. After twelve years' work it came wholly into the hands of M. Lassus, who finished it and built the flèche. The restoration was almost a renewal and the interior is possibly over-coloured.

The Conciergerie.—Very little of the ancient Palais de la Cité remains, but the Tour de l'Horloge at the corner of the Boulevard du Palais and the Quai de l'Horloge has been restored on its old lines and is partially old. The same may be said of the three round towers facing the river, which so effectively break up the long front on this side. Inside the building, but seldom seen, is an old vaulted hall. There is an excellent plan of the Palais de Justice in Mr. Belloc's book showing the different rebuildings and how the structure attained its present form.

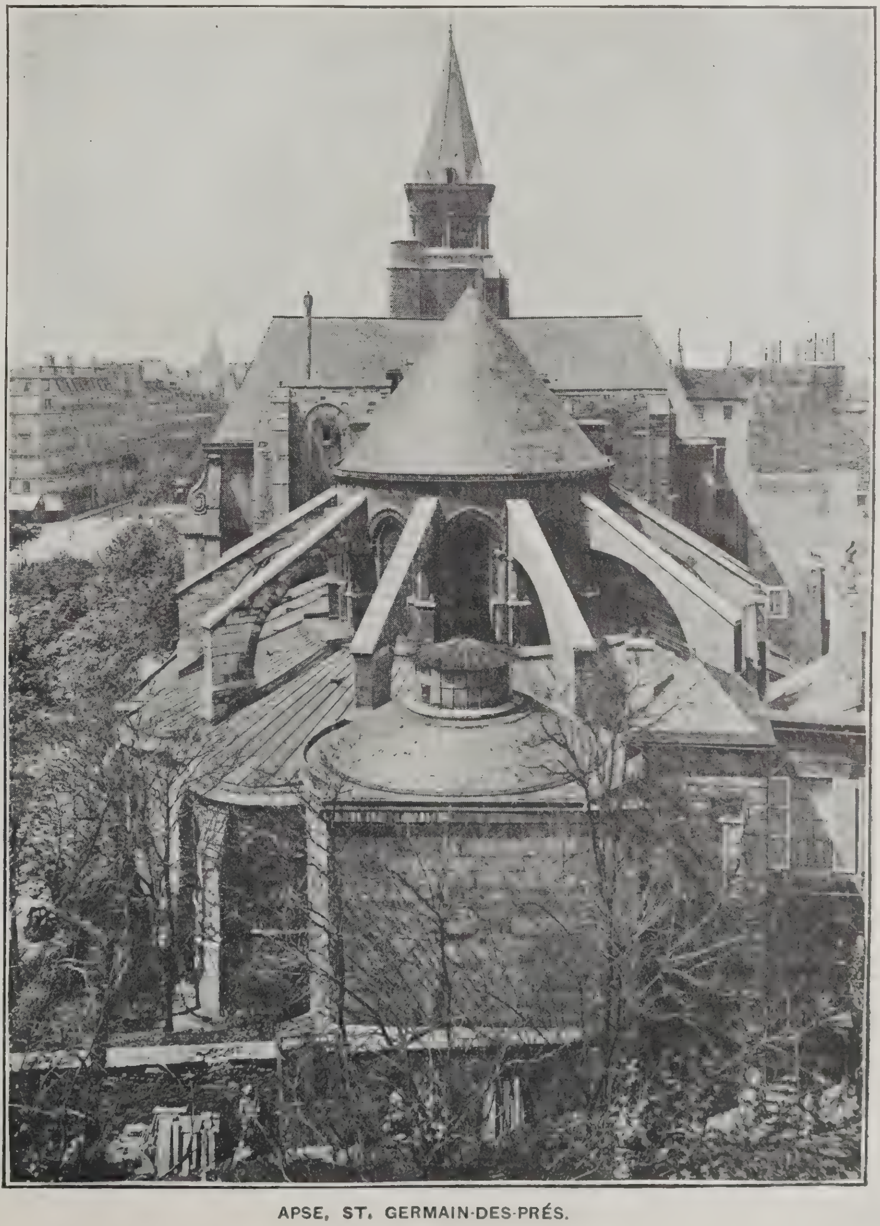
The Left Bank.

St. Severin.—The church of St. Severin is a prominent object from the towers of Notre Dame, lying just across the water to the south-west. Its slated tower and roof rise high above the houses. It is an extremely interesting church, and one of the best Gothic buildings in Paris. It stands off the Rue St. Jacques (which is a continuation of the Petit Pont) at the corner of the Rue St. Severin and the Rue des Prêtres. It has double aisles and chapels all round. There is a glazed triforium without passage, and lofty clearstory. The church is, therefore, very light. There is a good deal of 15th and 16th century glass. The building belongs to different periods. The nave is partly 13th century and partly 14th. The first three western bays, which have circular piers, are 13th century, together with the tower and the lower part of the west front. The porch is also of this date, but belonged formerly to a church on the island which was pulled down in 1837, when the porch was re-erected at St. Severin. The apse and chapels belong to the 15th century. The church was restored and enlarged in 1589 and again in 1684. There is a twisted shaft in the apse behind the altar.

St. Julien-le-Pauvre. — Close to St. Severin, in a narrow street at the other side of the Rue St. Jacques, is the little church of St. Julien-le-Pauvre. It is an exceedingly interesting building of late 12th century date (c. 1170). It has three parallel apses at the east end. The building is difficult to find unless one looks for it. It was fully described and illustrated in THE BUILDERS' JOURNAL for May 10th, 1905.

St. Germain-des-Prés.—At the corner of the Boulevard St. Germain and the Rue Bonaparte. It is the church of the former Abbey of St. Germain-des-Prés. The abbey buildings have been demolished, but stood till after the Revolution. Next, perhaps, to Notre Dame the church of St. Germain-des-Prés best repays the architectural visitor to Paris. The bulk of the present building belongs to the 11th century, but some remains of an earlier church still exist. The choir and apse were built in the 12th century, having been dedicated in 1163. The lower part of the tower is 11th century, and fragments of a 12th-century portal are enclosed in the later entrance. There were formerly two other towers at the angles of the choir and transepts, but these were taken down in 1822. The interior is a good specimen of the transition from Romanesque to Gothic. There is no triforium, and the spandrels of the arches are now filled with coloured pictorial decoration by Hippolyte Flandrin. This decoration of the interior was done between 1852 and 1861 and has been much criticised. The stone vault of the nave belongs to the 17th century, and a more thorough restoration took place rather less than a hundred years ago. The capitals of the nave are either the old ones reworked out of all recognition or new ones altogether. Some of the original ones were taken to the Palais des Thermes in the restoration of 1824 and replaced by copies. The choir capitals are, however, original and have not been painted. The work of the choir inside will repay careful examination. Outside the flying buttresses are very noticeable.

Hotel de Cluny.—Retracing one's steps along the Boulevard St. Germain to the Boulevard St. Michel, the old Hotel de Cluny will be observed where the two streets meet. The entrance is from the Rue du Sommerard. The building is very well known and needs no description. It contains a museum of medieval antiquities. It was begun in 1485 and finished in 1490, and was the town house of the Abbots of Cluny. The well in the courtyard is from a manor-house near Amboise. In the museum is the original



APSE, ST. GERMAIN-DES-PRÉS.

central pillar of the Porte Ste. Anne, Notre Dame (that at the cathedral being a copy), and other fragments of Gothic Paris.

St. Médard, the only other Gothic church on the Left Bank, is a long way from the Boulevard St. Germain and is hardly worth while one's going far out of one's way to see. If you are in its neighbourhood, however, it should not be neglected. Its history is more interesting than its architecture. It has a Gothic nave and aisles of the 16th century and a Renaissance choir.

In the Rue Hautefeuille, which runs from near the Place St. Michel to the Ecole de Médecin (crossing the Boulevard St. Germain), there are two medieval houses with corner turrets or "tourelles." This street takes you to the Ecole de Médecin, which occupies the site of the ancient Convent of the Cordeliers, the old refectory of which is used as a surgical museum.

Behind the Pantheon, near the Renaissance church of St. Etienne du Mont, still stands the tower of the destroyed church of Ste. Geneviève. It is Romanesque at its base and 14th and 15th century above. Some 11th-century capitals from the church of Ste. Geneviève may be seen in the courtyard of the Ecole des Beaux-Arts. The Ecole des Beaux-Arts is in the Rue Bonaparte, not far from St. German-des-Prés, and incorporates in its buildings the remains of the chapel of the Convent of the Little Augustins.

The Right Bank.

Most of the medieval buildings of the Right Bank lie in a zone parallel with the river, or along the line of the Rue St. Martin.

St. Germain l'Auxerrois is opposite the old Louvre, and is well known to tourists. The great porch was built by Jean Gaussel between 1431 and 1439. The church itself is of various dates from the 13th to the 16th centuries. It has double aisles surrounded with chapels. The interior has been much restored and the interest lost. Most of the porch statues are modern. North of the church stands the Mairie of the 1st Arrondissement, a building in the Renaissance style harmonising rather well with it, and between them is a modern Gothic tower designed by M. Ballu.

The Tour St. Jacques is at the corner of the Rue de Rivoli and the Boulevard de Sebastopol. It is all that remains of a former church and looked better before it was so completely isolated. The tower was built by Jehan Doullier in 1508-22. It was restored by M. Ballu in 1854.

St. Gervais is behind the Hotel de Ville and has a Classic front, added in 1616. The church itself is mostly of 16th century date. According to Mr. Hare, "the interior is one of the best specimens of Gothic architecture in Paris. The 16th century stalls are the only ones of the kind" in the city. The Lady Chapel bears the date 1517 and is a good specimen of Flamboyant work, with "angel pendants" to the vault. There is a good view of the apse from the Rue des Barres.

The Hotel de Sens stands at a corner of the Rue du Figuier off the Quai des Celestins. It is not easily seen unless looked for. From the Quai you turn up the Rue Fauconnier and the old house is soon visible. It was the town house of the Archbishops of Sens, then Metropolitans of Paris, and was built between 1475 and 1519. It is now a good deal mutilated and is used as a place of business. It is a good specimen of the domestic work of the late 15th and early 16th centuries. The Gothic gateway, which is flanked by corbelled turrets, is vaulted in a curiously irregular way. The courtyard should be entered if the gate is open.

MUSEE CLUNY.

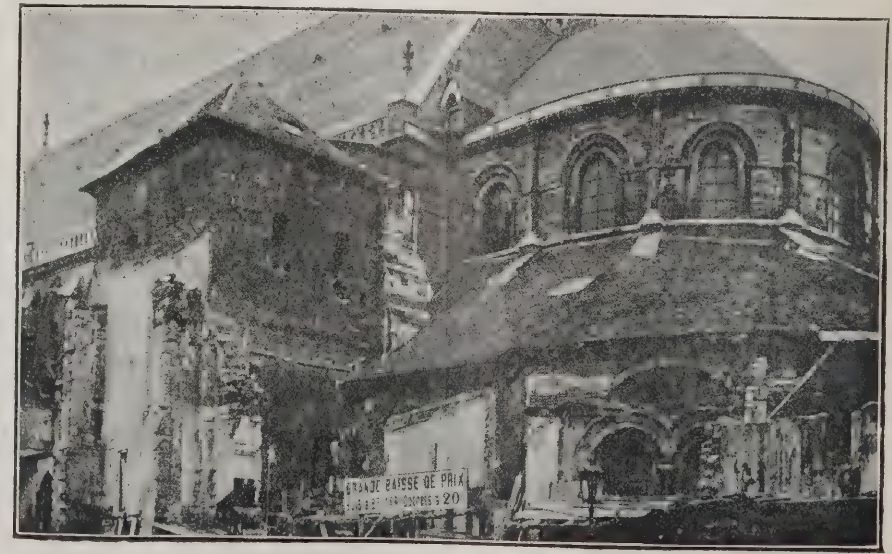
St. Merri.—The church of St. Merri is in the lower portion of the Rue St. Martin, not far from the Tour St. Jacques. The present building was begun in 1525 and finished in 1565, but looks older. The porch is a good specimen of late Gothic work, rich in effect, but its statues are modern copies. The upper part of the tower was pulled down in 1883. There is some good glass. The choir is disfigured by 17th century decoration. View of apse from the Rue Brisemiche.

St. Nicholas-des-Champs is higher up the Rue St. Martin. It dates from the 15th and 16th centuries. The five west bays, along with the western façade, are Gothic (1420), and the rest of the church eastward Renaissance (1576). The change of style is very noticeable.

St. Martin des Champs.—Close to St. Nicholas-des-Champs, in the Rue St. Martin, is the Conservatoire des Arts et Métiers. This building takes the place of the former Priory of St. Martin, which was outside the walls (in the fields) till the beginning of the 14th century. The church remains and is used as a museum of machinery. The choir and radiating chapels belong to the 11th century and can be seen very well from the street on the south side. The date is about 1159-67. The nave is without aisles and is 13th-century work. To the 13th century also belongs the ancient refectory, now used as a library, a long, vaulted room with a row of slender and graceful columns down the middle. Near one end is a reader's pulpit with a staircase in the thickness of the wall. The refectory is attributed to Pierre de Montereau.

One of the towers of the ancient priory buildings has been re-erected at the corner of the Rue Vertebois and the Rue St. Martin just above the Conservatorie des Arts de Métiers. This tower formerly marked the junction of the fortified part of the Abbey and its prison.

St. Laurent is near the Eastern Railway Station at the top of the Boulevard de Sebastopol. A not very interesting church, but worth looking at if one is in the neighbourhood. It was built in the 15th century, the oldest parts being the apse and tower. The nave and transepts belong to the end of the 16th century. Handsome Gothic-Renaissance interior. Much repaired from time to time and finally remodelled in 1865-6 when two bays were added and the nave and the present Gothic façade and spire were constructed towards the Boulevard.



ST. MARTIN DES CHAMPS.

St. Leu.—A small church of no great interest on the west side of the Boulevard de Sebastopol. Originally a Gothic building, but almost entirely rebuilt in the 18th century. Worth looking at if one is in the neighbourhood.

On the east side of the Rue du Temple the Rue de Bracque leads to a picturesque gateway comprised in the buildings of the Archives Nationales, and which is all that remains of the Hotel de Clisson, originally built in 1371. It was known later as the Hotel de Soubise. The gateway has a pointed archway and flanking turrets.

Close to, at the corner of the Rue Vieille-du-Temple and the Rue des Francs Bourgeois, there is a house which has a good corbelled angle turret of late 15th century date. It was restored in 1886.

There is a 14th-century tower in a court of the Rue Etienne Marcel, formerly belonging to the Hotel de Bourgogne. It is illustrated in Hare (Vol. I., 128).

St. Pierre de Montmartre is on the hill of Montmartre on the north (true west) side of the church of the Sacred Heart. It "presents a miserable front, but archæologists prize it as a monument of extraordinary interest. It was completely rebuilt in 1137. Partly burnt in 1559, it was half demolished in 1792 and restored without any regard to regularity or unity of design."

In the Musée de Sculpture du Moyen Age in the Louvre are some tombs and sculptures removed from still existing churches in Paris.

The Gothicist in Paris should not omit to visit the abbey church of *St. Denis*, which, though not in Paris, may be reached in a few minutes by either train or tram. St. Denis is too well known to need description, for here, French architects tell us, the Pointed Style was born. However that may be, St. Denis should not be neglected. The late 14th-century Gothic chapel of the Château of *Vincennes* is also worth looking at if one is in that neighbourhood.

"Xelite" Plaster.—Messrs. Clark and Co., of 32A, Westminster Palace Gardens, inform us that they have arranged with Mr. H. Mason, of 40, Brazennose Street, Manchester, to represent them for the sale of their new plaster, "Xelite," in Lancashire, Cheshire and Staffordshire.

Koh-i-noor Pencils.—In noticing in our issue for March 27th the attractive catalogue of these well-known and excellent pencils which has been issued by Messrs. L. and C. Hardmuth, we gave the address of the firm as 56, Ludgate Hill: this is incorrect, the London office being at 12, Golden Lane, E.C. The catalogue in question is in colours, entirely executed by English printers, and is a very creditable production. As regards the pencils themselves, these are so well known, and so much valued, that there is no occasion now to elaborate on their qualities. They are exceedingly good leads, which wear well throughout the whole length—not breaking off half-way through, as some pencils do—and they are obtainable in seventeen grades, thus meeting every possible requirement. Included in the list of specialities made by Messrs. Hardtmuth are copying pencils and coloured chalk pencils, besides many other interesting varieties made in every convenient shape and case for the pocket.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Buildings to Measure around Shrewsbury.

HALIFAX.—H. C. writes: "Is there anything to measure in or about Shrewsbury that would do for the testimonies of study for the R.I.B.A. intermediate examination? If so, kindly give a list; please also mention one or two nice small examples of half-timber work."

There are plenty of buildings in Shrewsbury and district suitable to measure. In Shrewsbury itself there are St. Mary's Church and the Abbey Church. St. Mary's contains work of all dates from the twelfth to the fifteenth century, and has good medieval glass: it affords ample material for architectural study. The Abbey Church is Norman, with later Perpendicular and some modern work. There are plenty of half-timber houses in Shrewsbury, such as Ireland's Mansions and the Guildhall. The market hall is a good detached Renaissance stone building, and the old Grammar School (now museum) belongs to the early part of the same period. In the neighbourhood of Shrewsbury are Wroxeter Church (Transitional Norman and Early English, with later tower); Buildwas Abbey (Transitional Norman work); Much Wenlock Priory (Early English, with Norman chapter-house); Shawbury Church (Norman work and late tower); Haughmond Abbey (Transitional Norman work); and Acton Burnell Church. Of the foregoing Buildwas, Much Wenlock and Haughmond are ruins. There are also many good halls or manor-houses in the district, such as Shipton Hall (17th century), and Plaish Hall (*c.* 1533), near Church Stretton; Pitchford Hall (1500-1514), one of the finest half-timber houses in Shropshire; Condover Hall, a Renaissance stone building; Moreton Corbet manor-house, Early Renaissance (in ruins), and Pink Hall, a fine half-timber house. If the district is extended, Ludlow may be included, with its fine church (13th, 14th and 15th century) and Castle. There are many good half-timber houses in Ludlow, including the Feathers Hotel and the Reader's House. Stokesay Castle is reached from Craven Arms Station. The gatehouse is a very good small example of half-timber work. Stokesay formed the subject of the R.I.B.A. Silver Medal drawings submitted this year by Mr. D. Robertson, for which he was awarded a certificate of hon. mention. The Architectural Association visited Shrewsbury and neighbourhood in August, 1891 (see the architectural journals for that date).

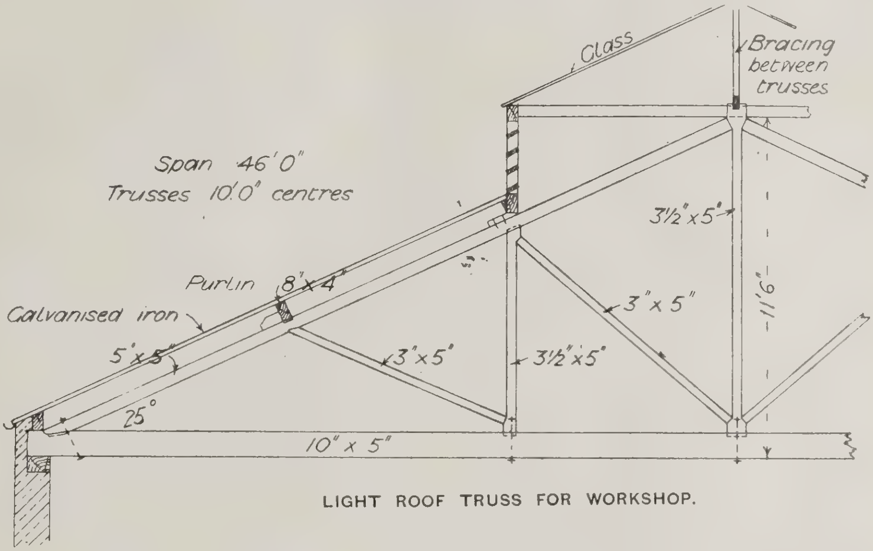
F. H. C.

Light Roof Truss for Workshop.

NORTHAMPTON.—H. R. writes: "I have to construct several roof trusses in wood to carry corrugated roofing, and should be glad if you would inform me the very lightest timbers that could be used in safety for a span of 46ft. over a workshop. I should be glad if you could sketch the principal so that we could have glass and louvres for ventilation in centre. Please also say how many principals will be required. The shop is 80ft. long."

The accompanying illustration shows the lightest possible truss for the proposed roof. There must be no brackets or hangers or shafting fixed to it, nor may the tie-beams be used for storing planks, &c. There will be nine trusses required, one at each end and the others 10ft. apart.

HENRY ADAMS.



LIGHT ROOF TRUSS FOR WORKSHOP.

Encroachment of Boundary Wall on Highway

HUCKNALL HUTHWAITE.—WEB writes: "I am building a boundary wall next to a main road, and have set the face of the wall 2 ft. beyond the centre of an old hedge-fence to the foot of the contour of an embankment. The Council's surveyor states that this is an encroachment on to the highway, as the Authority claim the road to the centre of the old fence. Is this an encroachment on the highway, or am I right in building the wall to the foot of the contour of the bank? I may say that other owners fronting the same highway have built boundary-walls 3ft. and more into the road."

Primâ facie, the boundary of any property is at the outer edge of the ditch, upon the legal assumption that an owner would dig the ditch upon the very extremity of his property, put the earth back upon his own land, and then plant the hedge upon this earth bank. Unless, therefore, the surveyor to the council in question can show that the ditch is not your property, and forms part of the highway over which the public possess the right of passage, you are entitled to build to the very edge of your land. This is probably to be found at 3ft. from the centre of the "stakeroot" of the hedge.

F. S. I.

Calculations for Reinforced Concrete.

BRADFORD. — TECK writes: "Kindly give the formulæ for calculating the sizes of concrete, joists, &c., for four systems of fire-resisting floors, three as per sketches (not reproduced), and Kahn's or some other reinforced system. Size of floor 30ft. by 20ft. For R.I.B.A. testimonies."

These columns are not intended to furnish readers with answers to examination questions, nor with calculations of stresses and strains for general problems. We are quite ready to answer any particular questions that do not come within ordinary practice, but in this case we can only refer our correspondent to the ordinary books on building construction and on stresses and strains. As regards calculations for reinforced concrete floors, we would refer him to the articles in our first five "Concrete and Steel" supplements, beginning May 23rd, 1906, and, for any other information, to Messrs. Marsh and Dunn's "Reinforced Concrete" or Mr. Twelvetrees' "Concrete-Steel."

Roof of Farm Building.

WALLINGTON.—RUSTICUS writes: "The accompanying sketch shows a farm building and the distance apart of the proposed principals. The estimated weights to be carried by each of the centre principals, including the ventilator and an allowance of 30lb. per sq. ft. vertical wind-pressure, are marked upon the outline diagram (not reproduced). Are the stress diagrams correct, and is the roof a practical design?"

When a roof carries lantern lights, turrets, or other projections it is desirable to take account of the side action of the wind, or to make a greater allowance than usual for the vertical loading. When the load on the different trusses or the distance between them varies, it is necessary to take the worst case and provide for that, as it would not pay to vary the scantlings of the trusses unless the difference were very great. For the present roof, if vertical loading only is taken, it should be estimated at the usual rate of ½cwt. per ft. super., to include structural load, snow, wind, &c., and taking the frame diagram, Fig. 1, as showing the outline of truss to be adopted, span 31ft., trusses 9ft. apart, the stress diagram will be as Fig. 2, and the stresses and scantlings as shown in Fig. 3. These come out a trifle heavy because the allowance is for a slated roof, and this is only covered with corrugated iron, and probably ⅜cwt. would have been sufficient allowance.

HENRY ADAMS.

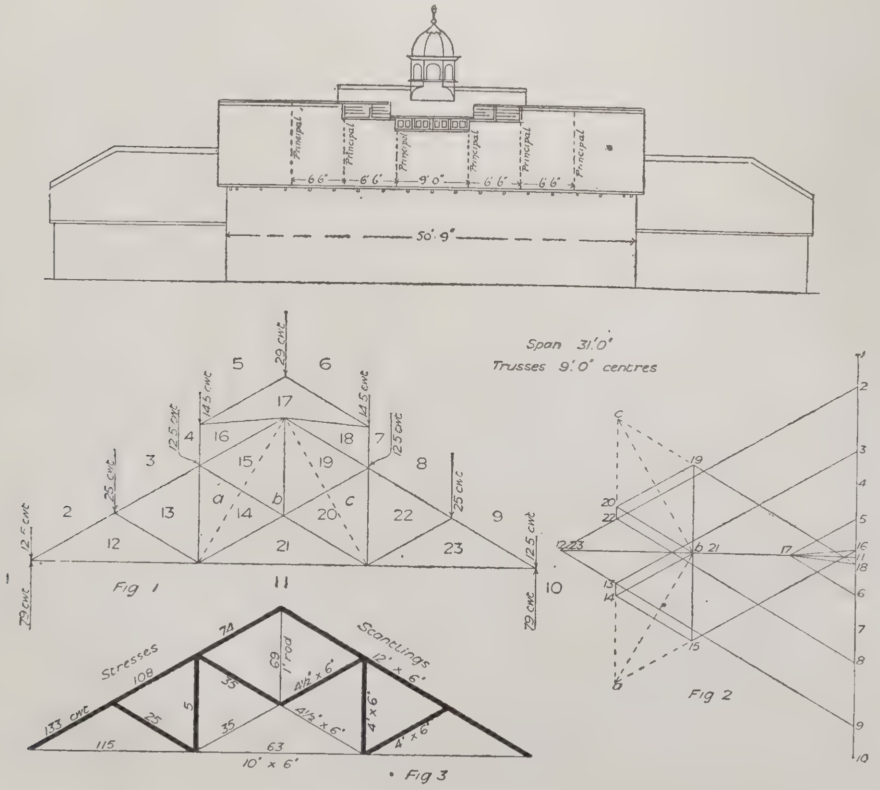


Fig 1

Fig 2

Fig 3

ROOF OF FARM BUILDING.

Book on House Property.

MANCHESTER.—DECIUS writes: "Please name some books dealing with the legal side of mortgages, chief and ground rents, and other matters pertaining to the ownership of house property; and also any containing hints to investors, particularly with regard to the smaller class of property."

There is no single book covering all the ground you mention, but you will probably find Tarbuck's "Handbook of House Property" (Weale's series), published at 3s. 6d. by Messrs. Crosby Lockwood & Co., to be very useful in many of the respects in which you require information.

F. S. I.

Black Spots on Pine Cleading.

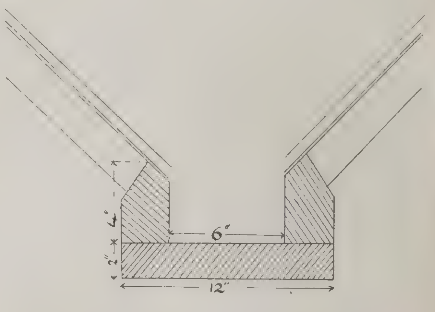
MORPETH.—L. writes: "Four months ago the walls of a new entrance lodge were covered with moulded yellow-pine cleading, first quality, and well seasoned. The walls were perfectly dry, but within the last month large black spots and streaks have appeared on the face and seem to penetrate right through. The cleading had two coats of best varnish immediately after fixing. I cannot understand the cause of this, and should be much obliged if you can explain it, and if possible suggest a remedy."

One can hardly venture an opinion upon this discolouration without local inspection; but I would hazard the enquiry as to whether something has not been spilled over the woodwork either before or after fixing. Otherwise one may fear that the black spots are of fungoid character caused by want of ventilation or by dampness; the varnish will, of course, tend to prevent the air from reaching the pores of the wood in much the same way as a covering of linoleum will so rapidly rot a wooden floor.

F. S. I.

Leaking Gutters.

LANARK.—ALPHA writes: "The accompanying section shows a gutter frequently used here between two greenhouse roofs.



The sole is 12ins. by 2ins., the sides are 4ins. by 3ins., bedded in red lead and nailed to the sole. In wet weather the gutter is not watertight. Can you suggest any means of making the gutters watertight?"

Probably the primary cause of leakage in the gutters shown by sketch lies in the fact that insufficient longitudinal fall has been allowed in their construction; there also appears to be no joint or waterbar to make the side joints impervious to water. The remedy for existing gutters would seem to consist in a sheet lead covering, though probably fillets along the side joints would greatly mitigate the present leakage.

F. S. I.

Old Cheshire Mansions.

CREWE.—CHESHIRE writes: "Please give a list of books dealing with old Cheshire mansions, houses, and churches. I should also like to know of a few good examples of architecture, within easy cycling distance of Crewe, other than Nantwich Church, suitable for R.I.B.A. final."

Mr. Henry Taylor's "Old Halls in Lancashire and Cheshire" gives drawings and descriptions of five Cheshire halls—namely: Moreton Old Hall, Adlington, Baguley, Harden, and Branhall. In the same author's "Notes on Sketching Tours," 1880, there is a list of old churches and halls in Cheshire worth sketching. See also an article on "Some Black and White Work in East Cheshire," by Mr. Percy Scott Worthington in the "Architectural Review" for December, 1897, Mr. J. P. Earwalter's "East Cheshire" may be consulted for accounts of the buildings in that part of the country, and Mr. Philip Sulley's "Hundred of Wirral" for those in the Wirral Peninsula. There are numerous papers in the "Proceedings" of the Lancashire and Cheshire Historic

Society and the Lancashire and Cheshire Antiquarian Society that might be useful. Astbury Church, two miles south of Congleton, and about 10 miles from Crewe, is an especially interesting building, and is not far from Moreton Old Hall (itself one of the best of the Cheshire half-timber mansions). Astbury Church has the finest rood screen in the county and good chancel stalls: the tower is almost detached on the north side. Mr. Worthington's article deals with Moreton, Bramhall and Adlington Halls, and the timber churches of Marton, Warburton, and Lower Peover. Marton is about three miles north of Congleton. In Nash's "Mansions" are drawings of the following Cheshire halls: Adlington, Bramhall, Brereton, Crewe, Dorfold, Little Moreton, and Lyme. F. H. C.

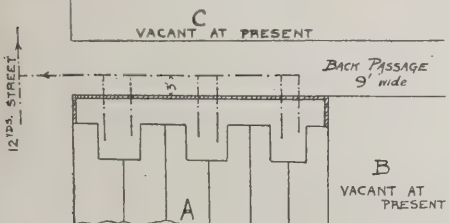
Calculating Flying Buttresses.

BELFAST.—IRISHMAN writes: "What is the method of setting-out flying buttresses to take the thrust of an arch about 30ft. span? Are there any books dealing solely with flying buttresses?"

There is no book dealing solely with flying buttresses. Their design requires a knowledge of mechanics sufficient to estimate the thrust from the arch or roof and the combination of this with the weight of the buttress; also a knowledge of the strength of the material to resist these forces. The only safe way to arrive at the necessary skill is to study the principles thoroughly, and then their application; to start at once on the stability of buttresses would probably land the designer in new difficulties with every job. HENRY ADAMS.

New Drain and Adjoining Owners.

MANCHESTER.—P.C. writes: "I am about to build six houses on the plot of land marked "A" on the accompanying sketch. I purpose making the drain in the back passage 3ft. from the passage wall. (1) Can I be compelled, either by the authorities or by the adjoining owners, B and C, to put my drain in the centre of the passage. (2) Can I be compelled to put my drain deep enough to take B's property when he builds? (3) Can C connect to my drain when he builds? (4) If I am compelled to put the drain in the centre of the passage, half of the drain will be on C's land. Can I claim half the cost from C? (5) Is there any special law or regulations bearing on these matters?"

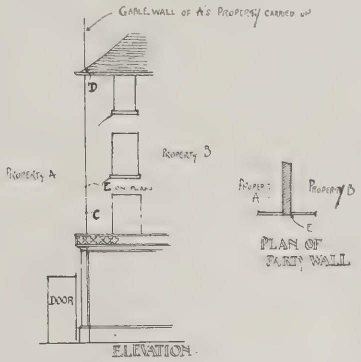


(1) You may put the drain wherever you choose (upon your own land!). (2) Your drain, being a private one, has no bearing whatever upon your neighbour's property, and you may build it precisely as you like, provided you do not violate the local by-laws. (3) C cannot connect to your drain without your permission; and no doubt in such case you would ask him to contribute towards its cost. (4) You cannot trespass on C's land without his permission. (5) Your drawing does not clearly show the boundaries of the various properties, and I have assumed that you propose to keep the drain within your own land; if the "back passage" is a public one, I am inclined to think that you would be well advised to arrange with your neighbours to connect with your drain (upon reasonable terms), in order that the "drain" may become a "sewer," repairable by the sanitary authority.

F.S.I.

Party Walls.

SHREWSBURY.—L. writes: "Referring to the accompanying sketch, A originally consisted of a stable, with a lean-to roof against the party wall separating A from B. A was burnt down, and new premises were erected on the site, the owner of B paying his share for rebuilding the party wall, damaged by the fire (between C and D on elevation). The owner of A continued the party-wall a considerable height above the point D, with the result that the additional weight has caused a settlement and is drawing down B with it. Has the owner of B any claim against the owner of A? (2) In building his new premises the owner of A brought the face of his new work on front elevation to the full width of the party wall (point marked E on plan). Has A a right to do this; if not, can B claim damages? Both properties are held under lease from the Corporation. (3) Can you recommend a book dealing with such subjects?"



(1) The London Building Acts clearly state that a building owner exercising his right to rebuild a party structure must "make good all damage occasioned," and I am of opinion the same rule holds good in the country. In this case, however, it may be difficult to prove that the subsidence was actually caused by the additional weight, and the decision may turn upon the question of negligence in design or workmanship to some extent. I do not advise action by B unless the case be very clear. (2) B can call for the removal of the encroachment upon his property. Your sketch elevation, however, appears to show a similar encroachment by B himself! (3) I believe the latest book on the subject is "Party Walls," by A. R. Rudall, published by Jordan & Sons, 116, Chancery Lane, W.C., price 7s. 6d.; but there are several others, and no doubt a reference to the Library of the R.I.B.A. would enable you to consult them.

F.S.I.

A Swing Bridge Problem.

LEWISHAM.—H. writes: "I have a swing bridge which is to revolve around on a pivot similar to an engine turntable. To overcome the sticking resistance of the weight on the pivot I find that I require a force of 90lbs. at 18ft. leverage. Can a single man exert this force? I cannot increase the leverage with a bar, as I have no room. What is the maximum a man can push horizontally?"

A turntable runs on cast-iron balls or rollers at the outer edge to reduce the friction. The force of a man in pushing, as at capstan bars, is 30 to 33lbs. moving at 120 to 150ft. per minute for a reasonable period, but it is possible for a strong man to increase the force to 100lbs. for a short period, or the velocity to 350ft. per minute, but not both at the same time. The pivot should be lubricated with thick grease. A greater force is always required to commence the movement than to continue it; this has been described as the difference between friction and sticktion. HENRY ADAMS.

Covering for Concrete Roofs: Street Paving.

SPHINX writes: "(1) What paving material could safely replace asphalt in connection with flat concrete roofs at an equal cost, and capable of resisting foot traffic? (2) What material (other than wood or flags) could replace asphalt for street paving, equally economical, and offering similar advantages in point of durability and solidity?"

(1) For covering flat concrete roofs we would suggest the use of "Ruberoid" (made by the Ruberoid Co., Ltd., of 81-3, Knightrider Street, Queen Victoria Street, London, E.C.), "Vulcanite"(made by Vulcanite, Ltd., 118, Cannon Street, E.C.), or one of the other special sheet roofings which you will see advertised.

(2) As regards material to replace asphalt for street paving (other than wood or flags), we would suggest "Durax," which is a species of the German *kleinpflaster*. It consists of small cubes of granite laid in mosaic form of interlacing semi-circular pattern, and is obtainable from Messrs. Durax Dustless Roads, Ltd., 57, Gracechurch Street, E.C.

Acetylene Gas Installation for Country Church.

PLYMOUTH.—A. W. P. writes: "I shall be glad to have some particulars of an installation of acetylene gas for a country church in Devonshire. The buildings comprise—church to seat 150 persons, Sunday school for 60 children, and two small classrooms, together with minister's vestry and choir vestry. Would it be best to use the non-automatic type of generator, in which the carbide is precipitated into a large volume of water? Should the shed for the accumulator be isolated? What would be the approximate cost of the installation?"

Messrs. Strode and Co., of 48, Osnaburgh Street, Regent's Park, N.W., kindly send the following reply to the above enquiry:—"The non-automatic type of generator, in which the carbide is precipitated into a large volume of water, will always be found the most satisfactory means of generating acetylene gas. The gas is stored in a storage-holder large enough to take the supply for the night's consumption. By these means there is no risk of failure of the light through any mishap, such as might occur with an automatic machine. It is always advisable to have the generator-house some little distance from the building. The generator-house should be well ventilated. The approximate cost of a complete installation for a small church, including non-automatic generator, storage-holder, and all necessary gas-pipes, and plain, well-constructed fittings, would be £160."

BETHNAL GREEN MUNICIPAL BUILDINGS COMPETITION.

Summary of Conditions.

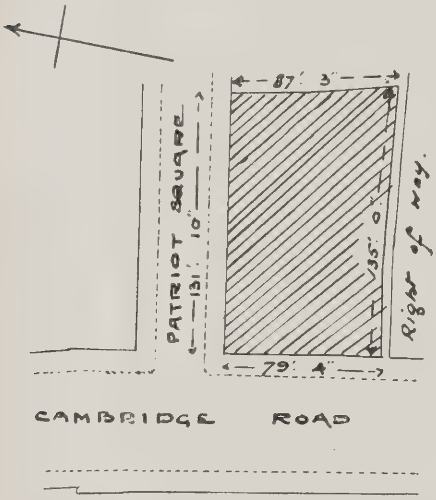
We give below a summary of the chief conditions of the competition for the municipal buildings proposed to be erected on a site at the corner of Cambridge Road and Patriot Square, Bethnal Green, London, N.E. These suffice to enable architects to decide whether or not they will compete. Those who wish to do so can obtain the full conditions from the Borough Surveyor, Mr. E. E. Finch, A.M.I.C.E., Town Hall, Church Row, Bethnal Green, upon payment of two guineas, "which will be returned upon receipt of a proper design."

An assessor (nominated by the president of the R.I.B.A.) will be appointed by the Borough Council to adjudicate upon the plans, with instructions to select the two best designs for the Council's consideration, premiums of £100 and £50 respectively being awarded to the authors.

The designs of all competitors "may be" exhibited at the Town Hall for a short time after the award has been made.

The two premiated designs shall become the absolute property of the Borough Council, who shall have liberty to adapt, adopt, and combine the features of any of the plans, elevations or sections in the design which they select to have erected.

The Council do not bind themselves to carry out any of the designs submitted, whether premiated or not.



Site Plan.

The architect whose design is accepted and who is instructed by the Council to proceed with respect to the erection of the buildings from his designs and under his supervision shall receive for his services an inclusive fee of 5 per cent. upon the cost of the work as executed, which fee shall include the preparation of all designs, modifications, drawings, details, specifications, and such copies as may be necessary, including the copies to be deposited with the Town Clerk for the Council's use, and copies for applications for loans, and for the superintendence of the work, settlement of final accounts (but not measuring or valuing any variations), and all questions with builders, contractors and others, and all matters and things arising out of or in connection with the erection and completion of the buildings. The premium awarded shall merge in and form part of the commission of 5 per cent. above mentioned.

The building is to be erected upon land shown on the plan supplied, and may be of any type according to the competitor's discretion.

Drawings required: Plans of each floor, one elevation to Cambridge Road and one elevation to Patriot Square, one longitudinal section and two cross-sections—these to 8ft. to the inch: block plan showing drains, &c., 16ft. to the inch: and one perspective of the exterior.

As the Council do not propose to spend more than £20,000 upon the buildings and furniture, cost will be an important element in determining the competition, and the necessity of strict economy in construction and avoidance of unnecessary outlay in architectural ornamentation, compatable with good workmanship and material, is urged upon all competitors.

(Accommodation particularised.)

The premium to the author of the accepted design shall not be paid if the Council on submitting the designs to public tender are unable to obtain a price for the erection of the buildings, in accordance with the conditions, by a responsible contractor at a sum not exceeding the estimated cost by 10 per cent. In such case the Council shall not be bound to employ the architect nor to build in accordance with his designs, and the architect shall have no claim on the Council whatever. The architect must deposit a full set of drawings with the Council for their own use, which shall be either drawn with ink on drawing paper, or be an approved "sun copy," together with details, specification, and such other particulars as may be necessary before any parts of the buildings are commenced to be erected.

If any further information is required, it will be supplied by way of reply by the Borough Surveyor, in a circular issued to all competitors, but no questions will be answered after June 24th, 1907.

The conditions and the accompanying plan can be obtained from the Borough Surveyor upon payment of £2 2s., which will be returned upon receipt of a proper design.

Designs to be delivered, carriage paid, to Mr. Robert Voss, Town Clerk, Town Hall, Church Row, Bethnal Green, N.E., not later than 4 p.m. on Monday, September 2nd, 1907.

COMPETITION FOR READERS.

To-morrow is the last day for sending in drawings for our "Architectural Dis-Orders Competition." We offer a prize of one guinea for the best two sketches for inclusion in the series. The drawings must be in ink, with no wash over them, and about double the size of the reproduction. On the back of each must be written the name and address of the sender, and the particulars of what is wrong. We reserve the right to use any of them.

Notes on Competitions

Council School, Rochdale.

In the competition for the proposed school at Oakenrod, Rochdale, eleven designs were submitted. That of Messrs. Sykes and Evans, Manchester, has been selected, and £10 each has been awarded to Mr. Jesse Horsfall, of Manchester, and Messrs. Smith and Cross, of Rochdale. The designs are on exhibition on May 3rd, 4th and 6th at the Education Offices, Baillie Street, Rochdale.

Prize for Architectural Decoration.

A gold medal, or a prize of £20, is offered by the Council of the Society of Arts for competition among school of art students for the best design for an architectural decoration, to be carried out in painting, stucco, carving, mosaic, or any other process. The decoration is to be for the side of a room or a hall, a ceiling, the apse or side of the chancel of a church, or any suitable part of the interior of a building. Each set must consist at least of a coloured drawing to scale of the whole design of decoration and two coloured drawings of details on separate Imperial sheets. Mere patterns or sketches of details, without the mouldings or borders necessary to make up a complete decorative scheme, will not be considered. The designs must have been made between April 1st last and March 31st next. Further particulars can be obtained from the secretary, Society of Arts, John Street, Adelphi, W.C.

A Golf Club House Competition.

The Southport and Ainsdale Golf Club, Ltd., of 13, Post Office Avenue, Southport (secretary, Mr. Chas. Leigh), are prepared to receive "competitive plans or sketches" for a club-house to be erected on a plot of land on the Liverpool Road, South Birkdale, containing 2,800 sq. yds., a site plan of which may be inspected at the above address. The requirements of the council as to accommodation are—dining-room, ladies' and gentlemen's lounges, ladies' and gentlemen's locker rooms, kitchen, two bedrooms, committee-room, &c. The number of lockers required will be—ladies' 100 and gentlemen's 200, arranged so that at any future time another tier may be added over the existing ones. The inclusive cost of the building and internal fixtures, such as lockers, lavatories, w.c.'s, is not to exceed £1,000. Plans, drawn to a scale of 8ft. to an inch, must be sent to the secretary of the club on or before May 11th next, under a *nom-de-plume*, accompanied by a letter giving the name and address of the architect. The plans will be adjudicated upon by the council, and the award announced. The architect whose design is accepted will be engaged by the council to complete his plans, prepare quantities and specifications, obtain estimates, and carry out the work at a remuneration of 5 per cent. on the total cost of the work executed under his direction. This commission is to include the necessary general detail drawings, quantities, specifications, general superintendence of works, and examining and passing of accounts. No premium or prizes will be awarded. Architects should design with a view to the adaptability to convert the building into a pair of semi-detached dwelling-houses at any time at small cost.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
May	7	ELEMENTARY SCHOOL AT HADFIELD, GLOSSOP.—(For 300 children) Architect placed first to be entrusted with the work: second premium of £20. Limited to architects practising within 30 miles of Glossop. Conditions from J. Walkden, Secretary to Education Committee, Howard Chambers, Glossop. Deposit, One guinea.
May	11	GOLF CLUB HOUSE AT SOUTHPORT.—No premium. Particulars on this page.
May	11	BUILDINGS FOR SCOTTISH NATIONAL EXHIBITION AT EDINBURGH.—Premiums of £100 and £75. Mr. J. J. Burnet, Assessor. Conditions from J. Marchbank, 45 York Place, Edinburgh. Deposit, One guinea.
May	17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June	1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
Aug.	27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept.	11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN. — Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas.
1908. March	31	MODEL COTTAGES, WOLVERHAMPTON. Particulars on page 220 of this issue.

Notes and News

The Alhambra at Granada is reported to be in a very serious condition, fears of its collapse being entertained.

An R.I.B.A. Special Examination at Johannesburg will be held next November under the auspices of the Transvaal Institute of Architects.

The Royal Visit to Glasgow.—On Wednesday last the Prince and Princess of Wales visited Glasgow, where they opened the new University Buildings, which have been erected from designs by Mr. James Miller, A.R.S.A., F.R.I.B.A., and subsequently laid the foundation-stone of the new Royal Infirmary, the architect of which is also Mr. Miller. The new University block comprises departments of physiology, *materia medica*, forensic medicine, and public health. The present Royal Infirmary was designed by Robert Adam in 1792, and contains 584 beds, and the new infirmary is to be erected without causing interruption to the old building. The work first being undertaken is that of erecting the surgical block, upon vacant ground immediately to the north of the present northernmost block. The design, it will be recollected, was selected by competition some years ago. Sir Henry Burdett is quoted as having said of it that "Glasgow will have in the new Royal Infirmary a modern hospital, up-to-date in all respects, and one which is likely to command attention. Several of its novel features are well calculated to constitute new units in construction which are likely to be generally adopted all over the world." The reconstructed infirmary will accommodate 660 patients. The work of reconstruction was begun last year.

Correspondence.

Darkening a Red-Tiled Roof.

To the Editor of The Builders' Journal.

Sir,—We notice an enquiry under the above heading on page 171 of your issue for April 10th, a correspondent asking where he could procure a solution for applying to a red-tile roof to darken the colour of the tiles permanently. In reply to querist, "G." fears that the case is hopeless. Will you allow us to correct him in this? Cabot's Creosote Stains (which we supply) would meet your correspondent's needs; and a still better result could be obtained by the use of Cabot's Brick Preservative, particulars of each of which we forward for your perusal.—Yours truly,

Arthur L. Gibson and Co.

19-21, Tower Street,
Upper St. Martin's Lane, W.C.

Motor Pits.

To the Editor of The Builders' Journal.

Sir,—In your issue for last week I notice "W's" question about paving for motor-pits. To do away with all doubt about the concrete being watertight, may I describe a method I employed recently, and which I believe is very often used—namely, to have two galvanised iron trays, with edges turned up about 1½ins., both made just half the size of the pit, with a handle to each, so that they can be easily lifted out. These trays not only catch any waste petrol, but also obviate the difficulty of sweeping the floor of the pit clean, and in the event of a small nut being accidentally dropped during repairs, they lessen the difficulty of finding same.—Yours truly,

F. R. S.

Winchester.

Earlestown Library.

To the Editor of The Builders' Journal.

Sir,—In my design awarded first place in this competition, the small room on right-hand side of entrance is the children's or ladies' room, not lecture-room. I trust you will see your way to rectify this in your next issue, as the size of the room scarcely warrants its being called lecture-room. Owing to an unavoidable alteration in the frontage line the scheme will require to be remodelled.—Yours truly,

J. Myrtle Smith.

Chelsea, S.W.

A Competition Design.

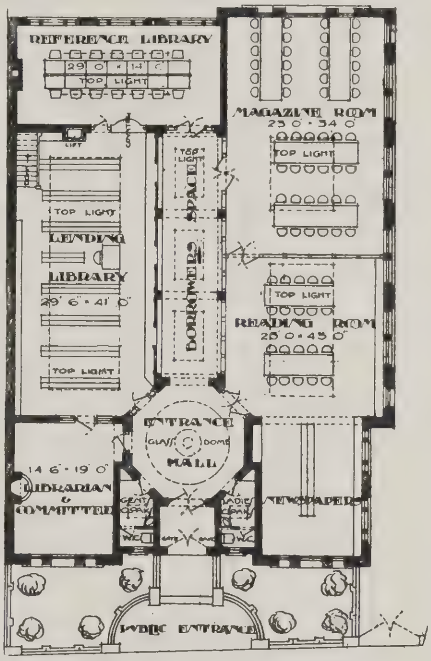
To the Editor of The Builders' Journal.

Sir,—We were interested in the plate in your issue last week showing the design placed first in the competition for a public library at Earlestown, Lancashire; also to your reference to it in the letterpress, where you say the design "is commendable in every respect," and later, "as a whole, is one of the best designs for a small library that has been seen for some time."

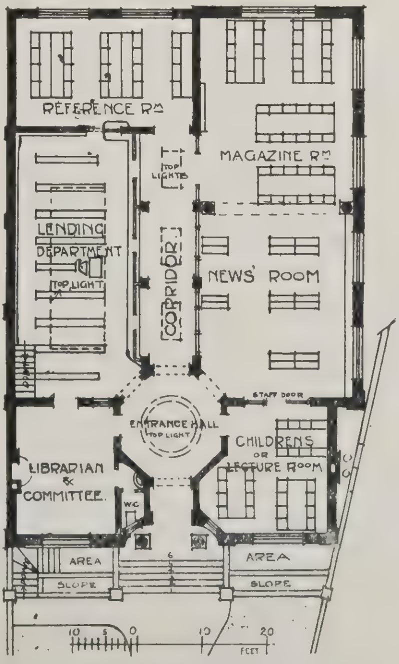
We send you a reproduction of the competition design for a library which we are erecting at Bangor, North Wales, which was published in your issue for May 23rd last year. We think the two are interesting, and will bear a close comparison.

We may say that we did not submit a design for the library at Earlestown, as we did not consider that the conditions were satisfactory.—Yours truly,

Manchester. Dixon and Potter.



SELECTED DESIGN FOR BANGOR LIBRARY.



SELECTED DESIGN FOR EARLESTOWN LIBRARY.

IN PARLIAMENT.

(By our Press Gallery Representative.)

Dublin Post Office.

Mr. Sydney Buxton, the Postmaster-General, answering a question by Mr. Delany, said it was not the case that the proposed structural alterations in the General Post Office in Dublin had been temporarily abandoned. On the contrary, a large extension of the building had recently been sanctioned, but some minor points had still to be settled.

Decoration of British Museum Reading Room.

Mr. H. C. Lea asked the First Commissioner of Works whether the gold-leaf used fifty years ago for the redecoration of the British Museum reading-room was guaranteed as British-made; and whether he could give an assurance that the firm who had the contract to redecorate the Museum would only use British-made gold-leaf for regilding purposes in connection therewith.

Mr. Harcourt, in reply, said: "It is believed that the gold-leaf used in 1857 was of British manufacture. There is no record of any guarantee. The reply to the second paragraph is in the affirmative. It has been specified that British-made gold-leaf only is to be used."

Mr. Harcourt informed Mr. Bridgeman that the contract for the decoration of the reading-room in the British Museum had been placed with Messrs. Waring and Gillow. No white-lead would be used, as the paint had been specified to have a zinc oxide base. This specification was adopted in all contracts of Government buildings.

In connection with this contract Mr. Bowles wished to know why it was not put out to public tender.

Mr. Harcourt stated that six firms were asked to compete. Public tendering would have been impossible in this case, as an unlimited number of people could not have been allowed access to the reading-room when it was in use by the public to take the measurements and particulars necessary to enable them to frame a tender.

MODEL COTTAGE EXHIBITIONS.

We illustrate on the next page the selected plans for the laying-out of the model villages at Sheffield and Newcastle-on-Tyne, in connection with the Model Cottages Exhibition to be held at each place in July next, under the auspices of the National Housing Reform Council.

The Sheffield Exhibition.

Messrs. W. Alex. Harvey and Arthur McKewan, joint architects, of Birmingham, have been awarded the gold medal for their plan for the Sheffield exhibition, the silver medal being awarded to Messrs. Currey and Thompson, of Derby, and the bronze medal to Mr. Claude Batley, of Kettering and London. The prize scheme shows 42 blocks of 4 cottages (168), 23 blocks of 3 cottages (69), 10 pairs of cottages (20), and 7 single cottages—a total of 264. Roads running east and west have been practically eliminated, so as to do away with much scheming in getting the sun on both sides of the cottages. The roads are from 40ft. to 45ft. in width, with footpaths 8ft. to 10ft. wide, planted with trees at intervals. The building line has been set back 20ft. to 30ft. from the roads. The average garden space to the cottages varies from about 350yds. to 500yds., giving 12 houses to the acre.

The Newcastle Exhibition.

With reference to the Newcastle exhibition, it will be seen by the accompanying illustration that the gold medal plan of Messrs. Watson and Scott, of Newcastle, disposes the roads in horse-shoe fashion. Here also it has been deemed essential to avoid the formality of houses built in straight lines, while the introduction of trees along the boundaries of the properties adds greatly to the scheme.

The Wolverhampton Exhibition.

An exhibition of model houses suitable for urban districts, together with designs of houses, building materials, &c., is to be held at Fallings Park, Wolverhampton, from May to July next year. Several prizes are offered in conection with it. In Class 1 there is a first prize of £50 (and gold medal) and a second prize of £25 (and silver medal) for the best and most economical house costing not more than £200, built either singly, in pairs, or in groups up to eight in number, and containing not fewer than three bedrooms. In Class 2 similar prizes are offered for a house costing not more than £150, and containing living room, scullery, and two bedrooms; while in Class 3, for the best detached house costing not more than £400, and containing not fewer than three bedrooms, with bath-room, a first prize of £50 (and gold medal) is offered, and a second prize will be awarded if there are more than six entries. Bronze medals will also be awarded in each class as recommended by the judges (three well-known London architects have agreed to act as such, and the Wolverhampton and Birmingham Architectural and Building Associations have been invited to appoint representatives also). Should the entries for either of the classes exceed 20, a third prize of £10 will be given. The cost in every case is to be the actual amount for which the cottage can be built, including architect's fees, builder's profit, and all necessary connections to sewers and to water and gas mains, but not including the cost of the land.

Prizes and diplomas are also offered in the following classes:—

Class 4 (open to architects and surveyors in Staffordshire, Worcestershire, and Shropshire): For the best design for laying out a suburban building estate of not less than 50 acres, with a restriction of 20 houses to the nett building acre.

Classes 5 and 5a.—For the best material, and for the best method of utilising steel in house construction.

Classes 6 to 8.—For the best designs and models of houses under Classes 1, 2, and 3.

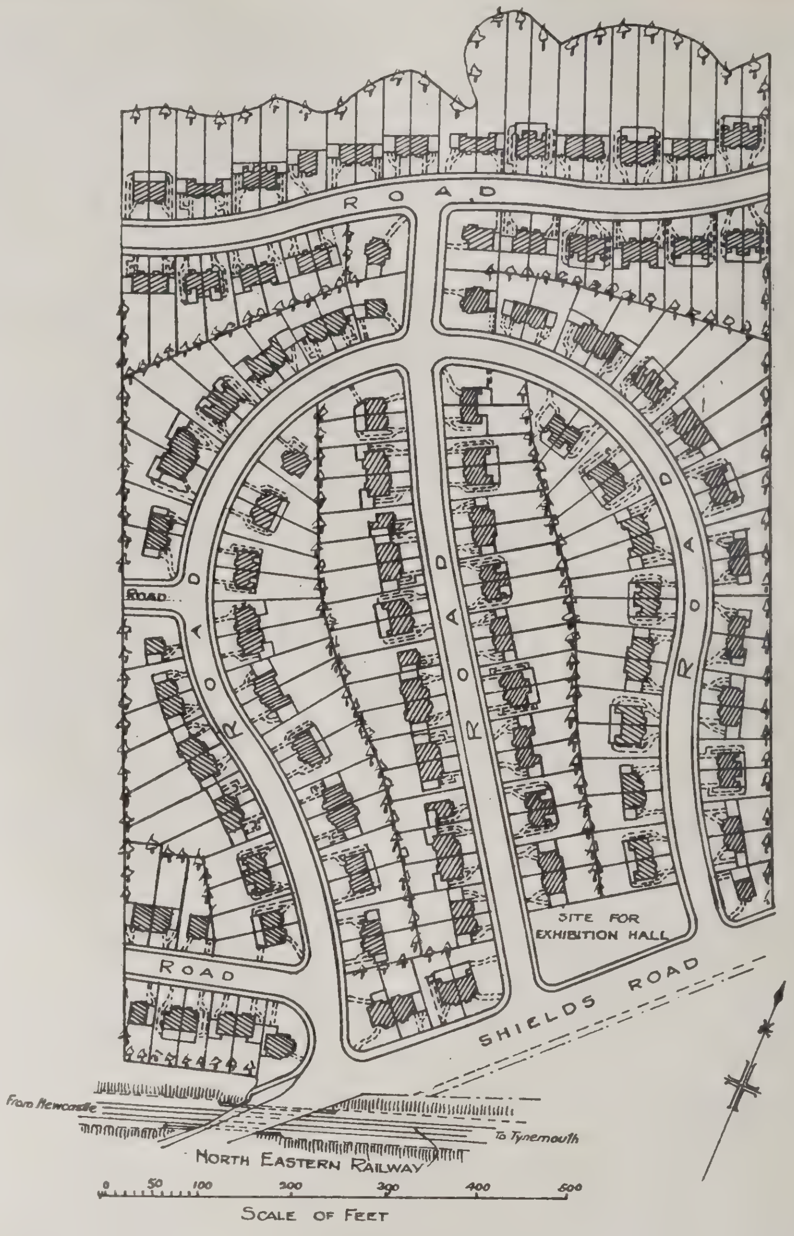
Class 9.—For the best laid-out garden.

Class 10.—For the best model garden in sand.

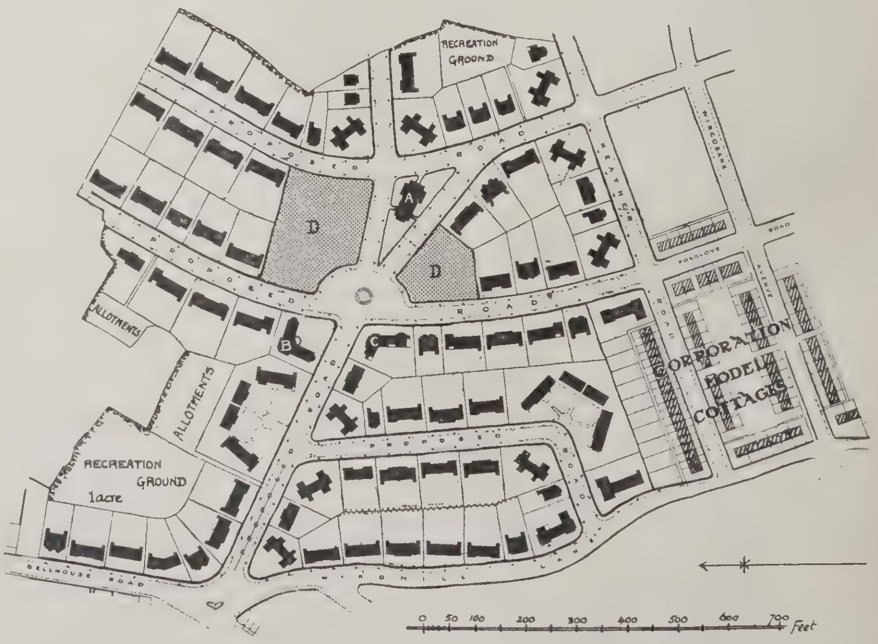
Class 11.—For the best fencing around any house included in the exhibition.

Prizes and diplomas will also be offered for building materials, patent ranges, baths, windows, &c.

Plans of houses to be built are to be submitted by August 1st next, and the houses to be completed by March 31st, 1908. Designs for houses are to be delivered also by this latter date. Full particulars can be obtained from Mr. Thomas Adams, hon. secretary to the Exhibition, Gresham Chambers, Lichfield Street, Wolverhampton.



GOLD-MEDAL PLAN FOR LAY-OUT OF MODEL COTTAGES EXHIBITION, NEWCASTLE. WATSON AND SCOTT, ARCHITECTS.



A, Village Hall; B, Hostelry; C, Doctor's House; D D, Sites for Public Buildings.

GOLD-MEDAL PLAN FOR LAY-OUT OF MODEL COTTAGES EXHIBITION, SHEFFIELD. W. ALEX. HARVEY AND A. McKEWAN, JOINT ARCHITECTS.

THE ARCHITECTURAL ASSOCIATION.

Liverpool Architecture.

The last meeting of the present session of the Architectural Association was held on Friday evening at 18, Tufton Street, Westminster, the chair being occupied by Mr. Walter Cave, vice-president.

The election of officers for the session 1907-8 was announced as follows :—

President: Mr. Walter Cave.

Vice-Presidents: Mr. Arthur Keen and Mr. Henry Tanner, junr.

Council: Messrs. R. S. Balfour, E. Guy Dawber, A. Needham Wilson, Louis Ambler, F. Dare Clapham, W. Curtis Green, E. W. M. Wonnacott, J. S. Gibson, and Sir A. Brumwell Thomas.

Hon. Treasurer: Mr. Henry T. Hare.

Hon. Librarian: Mr. Edwin Gunn.

Hon. Assistant Librarians: Mr. Percy May and Mr. T. W. Watkins.

Editor of "A. A. Notes": Mr. Baxter Greig.

Hon. Secretaries: Mr. C. Wontner Smith and Mr. Maurice E. Webb.

Hon. Solicitor: Mr. W. H. Jamieson.

Mr. Frank W. Simon, F.R.I.B.A., of Liverpool, then read a paper on "Liverpool Architecture," illustrated by a very interesting collection of drawings and photographs hung on the walls, and by a series of lantern views shown on the screen. Readers will recollect that in October last we published a special supplement describing and illustrating all the important buildings which have been erected in Liverpool within the last four or five years. In view of this, we only give a summarised report of Mr. Simon's paper.

The author pointed out that the oldest public building in Liverpool was

the Town Hall,

which was erected in 1756 from designs by John Wood, of Bath; the interior was destroyed by fire in 1795, and was reconstructed, the dome having been added at the same time. The reception rooms, which occupy the entire first floor, form a very fine suite treated in the Adam style (perhaps a little later), and they still contain the furniture of the period.

Then there was

St. George's Hall,

which had been described by Mr. Norman Shaw as the finest building in the world —at any rate, Liverpool people liked to regard is as such. Mr. Simon reminded his hearers that the building was erected between 1838 and 1854 from designs by Elmes, who was only 24 years old when he was awarded the first premium in competition; the work having been completed, after Elmes' untimely death, by C. R. Cockerell. "Without doubt St. George's Hall has had great influence in creating among the Liverpool architects and the Liverpool public a respect and love for noble and stately architecture. The interior, however, does not appear to me to be as successful as the exterior. The Madeline, in Paris, to which it may be compared, is much finer. It is also spoilt by the present colour decorations and the gaudy stained glass windows." At the back, or rather to the west front, of St. George's Hall, the Corporation have recently laid out "a garden," with terraces, walls, piers and railings—"a sad specimen of municipal bungling."

Cockerell designed the Bank of England in Castle Street, a building of great dignity and refined detail, combined with great vigour and originality. This building Mr. Simon recommended to students for careful study, and at the same time he suggested that it would be of high educational value for some student to measure Cockerell's more important works and publish them in book form.

The classical tradition created by St. George's Hall was continued in the designs of the Picton Reading Room or Rotunda, erected in 1860 from the designs of Mr. Thomas Allom; the Walker Art Gallery in 1874, from the designs of Messrs. Cornelius Sherlock and H. H. Vale; the Brown Library and Museum; and, finally, the Technical Schools and Museum extension, by Mr. Mountford.

The Municipal Buildings in Dale Street, opened in 1867, were completed by Mr. Robson. The Government Offices in Victoria Street was a simple building with carefully-thought-out detail. The Post Office opposite, a picturesque design in the French Renaissance style, was by Sir Henry Tanner.

Behind the Town Hall were the Exchange Buildings (by Henry Thomas Wyatt), enclosing a large space known as "The Flags"; this, however, had now a rather deserted appearance, owing to the removal of the cotton brokers to their new Exchange.

The University was an important work of the late Mr. Alfred Waterhouse, and another important building belonging to old Liverpool was the Custom House.

Having thus passed in review the buildings of old Liverpool, Mr. Simon went on to deal with the recent architecture of the city.

Mr. Norman Shaw's Works.

First he mentioned the head-offices of the White Star Steamship Co., by Mr. Norman Shaw, the design recalling New Scotland Yard. Mr. J. Francis Doyle, of Liverpool, was associated with Mr. Shaw in the design and construction of this building.

Another of Mr. Shaw's works was Parr's Bank, in Castle Street, carried out in conjunction with Messrs. Willink and Thicknesse. This, with its simple and beautifully proportioned fenestration, came as a delightful relief from the surrounding work, where every storey had a fresh motive and every window a fresh type of embellishment. The lower storeys were in granite, and the upper walls faced with marble, with grey bands; this was an experiment, and we had yet to see how marble stood in a Liverpool climate. (The window dressings and cornice are in terra-cotta). Then there was

the head office of the Royal Insurance Co.

the work of Mr. J. Francis Doyle—a building clearly showing Mr. Shaw's influence. For the large general office on the ground floor, which was required to be unobstructed by columns, Mr. Doyle had devised a very clever steel construction, quite independent of the walls. The steel stanchions rose from the sub-basement to the wall head. On the third floor they were connected by arched steel girders, 34ft. apart, and from these girders the first and second floor tie beams were suspended; the girders were hidden in the thickness of the double chimney breasts, and it was interesting to note that each chimney-stack weighed over 620 tons.

Mr. Doyle was also responsible for the Moss Street branch of the Bank of Liverpool, and the Bold Street branch of the North and South Wales Bank.

The New Dock Offices.

This was the largest building recently erected in Liverpool. Messrs. Briggs and Wolstenholme, F. B. Hobbs and Arnold Thornely were to be congratulated on the fine design they had now carried to a successful completion. It occupied the southern portion of one of the finest building sites in Liverpool—namely, the site of the old St. George's Dock, facing the landing-stage and the river. "Two streets have been carried across the old dock, dividing it into three portions. A little consideration and forethought, and the Dock Board would have reserved for themselves the central block and made their own building with its dome the central feature, reserving to themselves the control of the sites on either side, but they do not seem to have thought of this, They disposed of the other two sites without restrictions, and on one is to be erected a building with its main cornice 130ft. or 140ft. above the street level, whereas the cornice of the Dock Board offices is only 70ft. Thus the opportunity for carrying out a fine architectural scheme has been lost."

Mr. Simon described the building, in particular the dome, which is 50ft. in diameter at the drum, the stonework of which is supported on a steel structure, carried down to a concrete bed. (A large plate showing this steelwork is given in this year's issue of "Specification"—No. 10.)

Another important new building in Liverpool was Colonial House, the headquarters of the Elder Dempster Steamship Co. Messrs. Briggs and Wolstenholme, F. B. Hobbs, and Arnold Thornely were the architects for this also, and another work of theirs was the new Bluecoat Hospital at Wavertree.

Mr. Simon next described

the new Cotton Exchange,

of which, with Mr. Matear, he is the architect. The north-west elevation of this building is particularly interesting, being constructed entirely of steel encased with cast iron. This form of construction was adopted in order to reduce the divisions between the windows to a minimum, for the cotton sale-rooms are on this side of the building, and they require a steady sunless light, unobstructed by shadows. (A series of photographs of the new Cotton Exchange will appear in "The Architectural Review" for May.) It is interesting to note that this building, costing over £200,000 and carried in some cases 30ft. down to the solid rock, was erected, completed, opened and fully occupied in eighteen months; the contractors—the Waring White Building Co.—gaining a bonus of £2,500. In general, the plan has been laid out at 10ft. centres; this greatly facilitated the setting-out and provided, so to speak, a module for the whole building, helping in great measure to secure unity of scale and effect.

Church and Domestic Work.

In conclusion Mr. Simon referred to a few works of ecclesiastical and domestic character—the new cathedral, "a beautiful and original design" by Mr. Gilbert Scott; St. Agnes's Church, by the late George Edmund Street (the charming vicarage by Mr. Norman Shaw); the Church of St. Clare, "a very beautiful work" by Mr. Leonard Stokes; the important church on Mossley Hill, by Messrs. Austen and Paley, who were also the architects for the parish church at Waterloo; the church hall in the Ullet Road, by Mr. Percy Scott Worthington, "a charming piece of work"; the Swedish Church, by Mr. W. D. Caröe; an interesting house at Hoylake by Messrs. Woolfall and Eccles; "Dawpool" (Mr. Ismay's house), by Mr. Norman Shaw; the house in Bidston Hill designed for Mr. Hudson by Messrs. Grayson and Ould; and, finally, the industrial village of Port Sunlight.

Discussion.

A vote of thanks to the lecturer was proposed by Mr. E. Guy Dawber, seconded by Mr. W. Curtis Green, and supported by Mr. H. H. Statham, Mr. E. W. Wonnacott, Mr. Louis Ambler, Mr. Arthur Keen and Mr. Walter Cave.

Mr. Dawber said he thought it was a very good idea to have this paper on Liverpool, and he hoped it would be a precedent for papers on other provincial cities; Birmingham would be an excellent city to deal with. In his opinion no city showed so much the influence of Mr. Norman Shaw as Liverpool. Parr's Bank was an ideal for a dignified city facade. Whether or not the marble treatment there adopted would be found ultimately successful had yet to be seen. He believed the marble needed to be cleaned every year or two. In London they had an example of marble treatment in the Junior Constitutional Club in Piccadilly. That building, however, got as black as any other in the metropolis. The Liverpool Cotton Exchange Mr. Dawber considered to be a magnificent building. What particularly struck him was the rapidity with which the work was executed, and he congratulated the architects on the beautiful design which they had produced under such conditions. The garden which the Corporation had created at the back of St. George's Hall was indeed deplorable, and it was very unfortunate for the sculptors (such as Mr. Goscombe John) who had their work placed in such ill-conceived surroundings.

Mr. Louis Ambler echoed the opinion that the buildings of Liverpool were a very fine collection; they were not surpassed, if equalled, in any other city of the Kingdom.

Mr. Walter Cave mentioned, in connection with the suggestion that other cities might be dealt with, that a weekend visit of the Association to Birmingham at the end of June had been arranged, when Mr. Bidlake and Mr. Bateman would act as leaders of the party. Mr. Cave said he was much struck by the details of the Royal Insurance building (by Mr. Doyle) and the lavish manner in which everything had been carried out there—bronze architraves, rich marble and woodwork, &c., nothing seeming too expensive. With regard to the new Cotton Exchange, he thought that the system of setting-out the design at 10ft. centres was of much interest. The steel and iron construction was also very interesting.

Mr. Simon, replying, said he believed that £35,000 had been spent by the Corporation on laying out the garden at the back of St. George's Hall.

Obituary.

The Rev. Thomas Perkins, M.A., rector of Tunworth, who died recently, in his 65th year, was the author of a "Handbook to Gothic Architecture," and of several handbooks on cathedrals and churches in "Bell's Cathedral Series," as well as of many articles of archæological and architectural interest. At the time of his death he had just completed a book on Romsey Abbey Church, and was editing (and in part writing) another book on "Memorials of Old Dorset."

QUANTITY SURVEYORS' ASSOCIATION.

Annual Dinner.

The annual dinner of the Quantity Surveyors' Association was held last Friday at the Criterion Restaurant, W. Mr. A. J. Gate, F.S.I., president, was in the chair. The number of guests attending was about sixty. After the Royal toasts, Mr. A. A. Hudson proposed "The Quantity Surveyors' Association." He referred to the great progress which the Association had made since its formation three years ago, and to the good work which it had already done. He thought an architect required the assistance of a business man such as the quantity surveyor, and in future the architect would probably say that he only designed a building, and that the quantity surveyor was his associate in the work! He thought the Quantity Surveyors' Association might well give its attention to the form of conditions for building contracts. The president, in responding, referred to the fact that the Association had received no assistance from the Surveyors' Institution. They had managed to move that body to take action in regard to some questions of quantity surveyors' fees, but it was not doing its duty to the profession which it was supposed to represent. The Association had not asked architects or builders for assistance in the work they had undertaken. They felt they were strong enough to carry the matter through successfully. They would not ask for assistance, although they were working not only for the profession of surveyors, but also in the interests of architects and builders. As regards Mr. Hudson's suggestion that they should take in hand the question of the form of conditions for building contracts, he did not think it was advisable unless the Institute of Builders first asked for their assistance. The form of conditions which had been adopted two years ago was as fair as could be drawn up on the present lines and seemed to be working fairly satisfactorily.

Mr. W. R. Hood, F.S.I., London, vice-president of the Association, proposed the toast of "The Architects." He thought the quantity surveyors were the practical advisers of architects. He desired to see the profession of quantity surveying kept quite distinct from the profession of architecture. Mr. Alfred W. S. Cross, M.A., F.R.I.B.A., responded. He remarked that when he began practice quantity surveying was understood by architects. At that time many provincial architects took out their own quantities, and he thought that the Association would eventually have to face the difficulties of such a position. It was a danger they would have to get over. The provincial architect, of course, must make his living. He thought that would always prevent them making theirs a close profession. He thought the Association should apply itself to the drawing up of a uniform system of quantity taking.

Mr. H. T. A. Chidgey proposed "The Contractors," which was responded to by Mr. Frederick L. Dove, L.C.C., president of the London Master Builders' Association, who mentioned that clients had taken precautions against the possible bankruptcy of the builder, requiring guarantees, &c., and he thought that the builder should be protected against the bankruptcy of the client. It was most unfair that the builder should have his work seized on behalf of creditors; he thought the builder should have a first charge upon the work he had carried out in case of bankruptcy of the client. Mr. Walter Lawrence, F.S.I., past-president of the Association, proposed the toast of "The Visitors," which was responded to by Mr. J. Howard Colls.

Coming Events.

Wednesday, May 1.

INSTITUTE OF SANITARY ENGINEERS.—Mr. N. W. Hoskins on "The Science of the Air with Respect to Ventilation," at 8 p.m.

Saturday, May 4.

EDINBURGH ARCHITECTURAL ASSOCIATION.—Associates' visit to William Turner & Sons' stone dressing works.

ROYAL SANITARY INSTITUTE.—Inspection and demonstration at the Sewage Outfall Works, Barking, at 3 p.m.

Monday, May 6.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.—Annual general meeting, at 8 p.m.

SURVEYORS' INSTITUTION.—Annual Meeting (Junior), at 6.15 p.m.

SOCIETY OF ENGINEERS.—Mr. E. R. Mathews, A.M.I.C.E., on "Waterworks Constructions in America," at 7.30 p.m.

Wednesday, May 8.

SURVEYORS' INSTITUTION.—Annual Dinner (Junior), Trocadero, at 7 p.m.

Monday, May 13.

SURVEYORS' INSTITUTION.—Mr. Maurice L. Gwyer, Barrister-at-Law, on "The Prevention of Corruption Act, 1906."

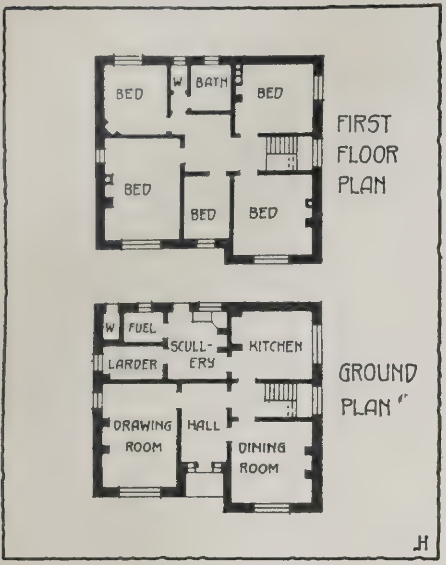
Holyrood Chapel was dealt with by Mr. Hippolyte J. Blanc, R.S.A., at last week's meeting of the Edinburgh Architectural Association, the lecturer tracing the history of the building and describing its features in detail, his remarks being illustrated by lantern views prepared by himself. While not entering into any questions connected with the proposed restoration of the chapel, Mr. Blanc said that if any restoration were undertaken strict care ought to be taken to leave the existing features undisturbed. The following officer-bearers were elected for the session 1907-1908: President, Mr. Hippolyte J. Blanc, R.S.A.; past-president, Mr. H. O. Tarbolton, F.R.I.B.A.; vice-presidents, Mr. W. J. Oldrieve, F.S.I., F.R.I.B.A., and Mr. John M'Intyre; hon. secretary, Mr. Colin B. Cownie; Mr. Alfred Greig, Mr. A. Hunter Crawford, F.R.I.B.A., and Mr. Victor D. Horsburgh, A.R.I.B.A., being appointed members of the Committee of Management.

Devon and Exeter Architectural Society.—The annual meeting of this society was held last week at Torquay. The annual report gave the present membership as 95. The retiring president, Mr. Harbottle Reed, F.R.I.B.A., delivered his valedictory address. Referring to architects' registration, he said that the principle of statutory qualification having now been adopted, the R.I.B.A. committee was framing a measure to render it operative; the suggested provisions would probably be approved or not, according as they were regarded as aiding the advancement of architecture or the protection of the practitioner. The president drew attention to the destructive work of the speculating builder on the outskirts of towns, and the manner in which houses of a good class were being confronted by rows of very low rental houses; and, referring to the question of city approaches, he suggested that more might be done by planting trees along the lines, so as to obscure the unsightly backs which now were so prominent. After the address the elections for the ensuing year took place, Mr. M. A. Bazeley, of Plymouth, being elected president, Mr. O. Ralling vice-president, and Mr. Allan J. Pinn hon. secretary.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Thirteenth Series.)

CLASS A (ARCHITECTURE).



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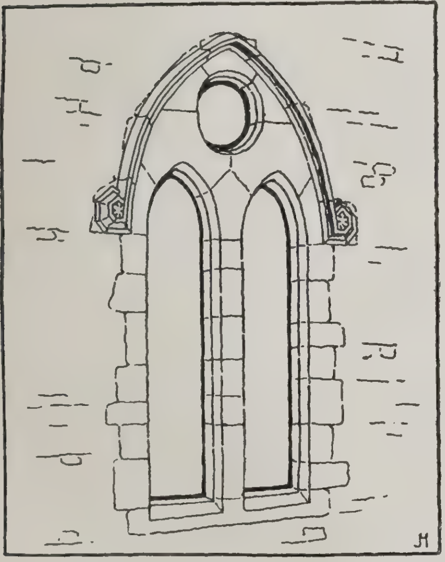

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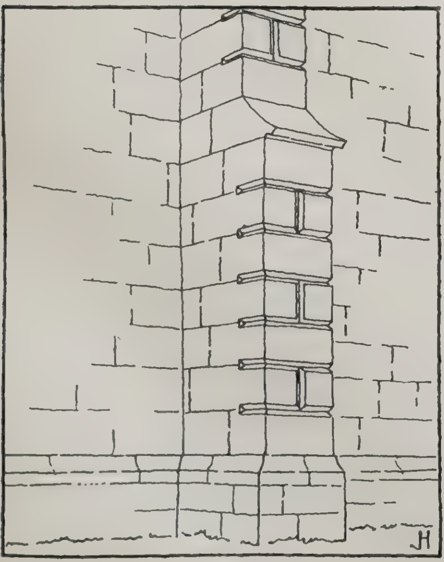

A 36

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

10. Any violation of these rules will entail disqualification.

11. The Editor's decision on every matter will be final.

Particulars of a new competition in connection with this "Architectural Dis-Orders Competition" will be found on p. 218 of this issue.

(*For Coupons see page xxviii.*)

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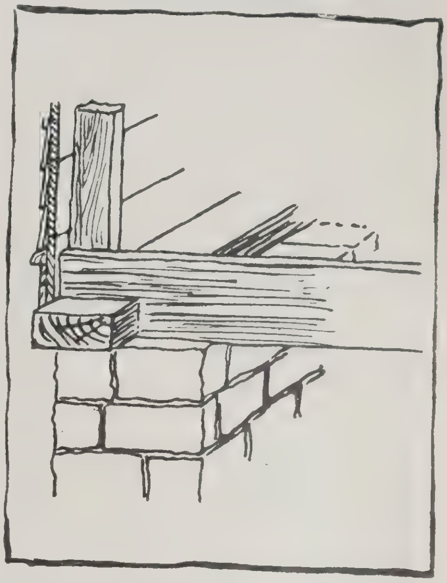
*Copies of "*THE BUILDERS' JOURNAL*" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

CLASS B (BUILDING).



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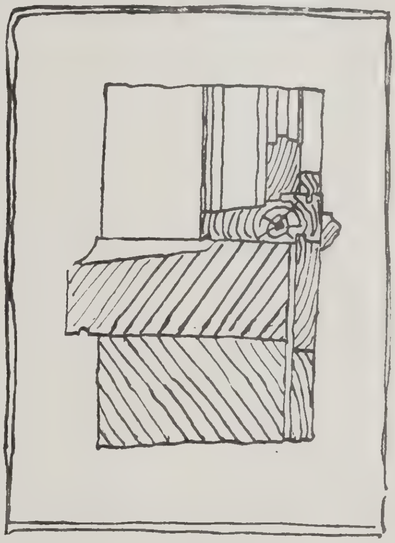

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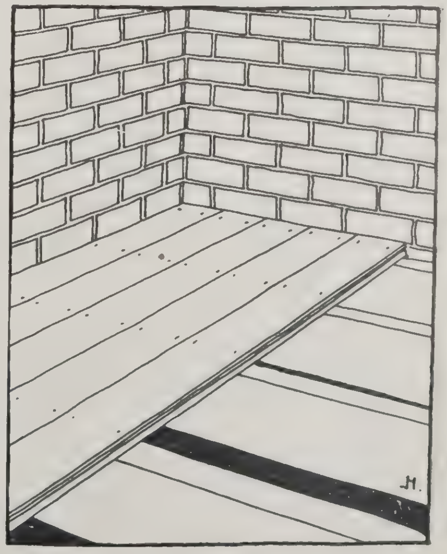

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Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

May 3. London.—*Admiralty extension, Block IV.* (superstructure). Drawings, specification, and a copy of the conditions and form of contract may be seen on application to Sir Aston Webb, R.A., 19, Queen Anne's Gate, S.W. Bills of quantities and forms of tender may be obtained at the undermentioned address on payment of £1 1s. Tenders must be delivered before 12 noon on May 3, addressed to the Secretary, H.M. Office of Works, &c., Storey's Gate, London, S.W., and endorsed "Tender for Admiralty Block IV."

May 3. Walsoken.—*Enlargement and improvement* of the Walsoken (Norwich Road) School. Persons desirous of tendering should send in their names not later than 12 noon on April 12, to T. M. Kerridge, architect, Club Chambers, Old Market, Wisbech, from whom bills of quantities can be obtained on and after April 19, and at whose offices plans and specification can be inspected. A deposit of £1 1s. will be required. Tenders must be delivered by 12 noon on May 3, addressed to "The Secretary, Norfolk Education Committee, 57, London Street, Norwich." and endorsed "Tender for Walsoken School."

May 4. Glasgow.—*Alterations proposed to be made* on property Nos. 5-11, College Street. The plans may be seen, and copies of the schedule of quantities and forms of tender obtained, upon application to W. C. Menzies, 22, King Street, City. Tenders, marked "City Improvements Department: Alterations 5-11, College Street," to be lodged with A. W. Myles, town clerk, City Chambers, Glasgow, on or before May 4.

May 4. Lancaster.—*Erection and completion of new villa* for private patients, for the Visiting Committee of the County Lunatic Asylum. Plans and specifications may be seen and bills and quantities obtained on application at the office of H. Aspinall, architect, Prudential Buildings, Dale Street, Liverpool, upon payment of £2 2s. Tenders, addressed "The Chairman of the Visiting Committee," and endorsed "Tender for Villa," must be delivered at the Asylum not later than the first post on May 4.

May 4. Blackburn.—*Re-pointing St. George's Presbyterian Church* and schools, Preston New Road, Blackburn. Specifications may be had from F. J. Parkinson, architect, 9, Richmond terrace, Blackburn, and tenders to be delivered on or before 12 noon, May 4, to the Secretary, R. Ferguson, solicitor, 9, Tackett Street, Blackburn.

May 4. Treorchy.—*Erection of minister's house* at Treorchy, for the Trustees of Calfaria Wesleyan Chapel, Treorchy. Plans and specification may be sen at the office of W. D. Morgan, M.S.A., architect, Post-office Chambers, Pentre, Rhondda. Sealed and endorsed tenders to be delivered to L. Hughes, 37, Maindy Road, Ton Pentre, on or before noon of May 4.

May 4. Eastbourne.—*Erection of a new public elementary school* for infants, with cookery school, &c., over the same on the East Street site, according to plans and specification prepared by F. G. Cooke, A.R.I.B.A., architect, 2, Hyde Gardens, Eastbourne. The plans and specification may be seen and bills of quantities obtained at the office of the architect, as above, upon payment of £1 1s. Sealed tenders, endorsed "Tender for Schools, East Street," addressed to H. W. Fovargue, town clerk and secretary to the Education Committee, Education Office, Town Hall, Eastbourne, must be delivered not later than noon on May 4.

May 4. West Riding.—*Builder, joiner, slater,* plumber, plasterer and painter work at the following:—Askwith New School, Anston New School, Paythorne New School, Kiveton Park New School, Sykehouse New School; improvements and new screen at Rawmarsh—Ashwood Road Provided School; asphalting at Darton—Barugh Provided School. Plans may be seen and bills of quantities obtained on application to the office of J. Vickers-Edwards, county architect, County Hall, Wakefield. A deposit of £1 is required in each case. Cheques, &c., must be made payable to the West Riding Treasurer, and sent to him direct, at the County Hall, Wakefield, otherwise applications will not be entertained. Sealed tenders, properly endorsed, to be forwarded to the County Architect not later than 10.30 on the morning of May 4.

May 6. Aberchirder.—*Erection of house and shop* in Aberchirder, for Mr. J. Auchanachie, draper. Plans and specifications to be seen with R. B. Pratt, architect, Town and County Bank Buildings, Elgin, who will receive estimates not later than May 6.

May 6. Leeds.—*Erection of 12 back-to-back houses* in Harehills Lane, Leeds, for Mr. T. H. Axe. Contractors wishing to tender must please forward their names to T. Winn & Sons, architects and surveyors, 84, Albion Street, Leeds, on or before May 6, when bills of quantities will be duly forwarded.

May 6. Merthyr Vale.—*Erection of a chapel* at Merthyr Vale for the Methodist Connexion. Plans and specification may be seen and all particulars obtained at the office of W. Dowdeswell, architect, Treharris. Tenders, endorsed "Chapel," to be sent to E. R. Hughes, Prospect Place, Merthyr Vale, on or before May 6.

May 6. Eccles.—*Erection of a public elementary school* in Clarendon Road, Eccles. The plans may be inspected at the office of H. Lord, architect, 42, Deansgate, Manchester. A copy of the specification and bill of quantities may be obtained from E. Parkes, town clerk, Town Hall, Eccles, on April 24, on payment of a deposit of £2 2s. Tenders to be delivered, in an official envelope endorsed "Clarendon Road School," to the Town Clerk not later than noon on May 6.

May 6. Mountain Ash.—*Erection of a cookery school,* with the necessary offices, boundary walls, &c., at the rear of Duffryn School, Mountain Ash. Plans and specifications may be seen and forms of tender and bills of quantities obtained on application to W. H. Williams, architect, Town Hall, Mountain Ash, upon the deposit of £2 2s. The bill of quantities is to accompany the tender, but in a separate sealed and endorsed envelope. The Committee undertake to open only that bill of quantities sent in by the contractor whose tender will be accepted, and to return all the other bills of quantities unopened. Sealed tenders and sealed bills of quantities, endorsed "Mountain Ash Cookery School," to be received by A. Morgan, director of education, Town Hall, Mountain Ash, not later than May 6.

May 7. Luckett.—*Erecting certain improvements,* &c., at the Luckett Council School, for the Cornwall Education Committee, according to the drawings and specification, which may be seen at the school or at the office of B. C. Andrew, architect to the Committee, Biddicks Court, St. Austell. Forms upon which all tenders must be made may be obtained at the school or from the architect. Sealed endorsed tenders to be sent to F. R. Pascoe, secretary, Education Office, Truro, on or before May 7.

May 7. Withiel.—*Enlarging the playground* and alterations to offices at the Withiel County school, for the Cornwall Education Committee, according to plans and specification, which may be seen at the school or at the office of B. C. Andrew, architect to the Committee, Biddicks Court, St. Austell. Forms upon which all tenders must be made may be obtained at the school or from the architect. Sealed endorsed tenders to be sent to F. R. Pascoe, secretary, Education Office, Truro, not later than May 7.

May 8. Cranbrook.—*Erection of a chimney shaft* and repairs to cook-house and other buildings at the Workhouse at Cranbrook, for the Guardians of the Cranbrook Union. Drawings and specifications of the works may be seen on application at the Workhouse. Forms of tender and any further information required may be obtained from C. Payne, surveyor, Cranbrook. Tenders must be sent to T. H. Crampton, clerk, Cranbrook, before May 8.

May 8. Manchester.—*Supplying and fixing tiled dados* at the Mansfield Street (Ardwick) and Seymour Road (Clayton) Municipal Schools, for the Manchester Education Committee, in accordance with a specificaion, which may be obtained at the offices in Deansgate, Manchester, on a deposit of £1 1s. Tenders, enclosed in the envelopes provided, must be delivered not later than May 8. Cheques to be made payable to the Accountant, Education Offices, Deansgate, Manchester.

May 9. Lyminge.—*Building an office* and foundations for a weighbridge at the Workhouse, Lyminge. Plans and specifications can be seen at the office of R. Lonergan, clerk, 11, Cheriton Place, Folkestone, where tenders are to be delivered before 5 p.m. on May 9.

May 9. Kirkburton, Yorks.—*Erection of a new organ chamber* and other works to Kirkburton Church, Yorkshire. Builders desirous of tendering may inspect the plans and specifications on application to A. Carter, Dene Works, Kirkburton, till May 9, when tenders are to be sent in. Quantities for the separate trades may be obtained on application to W. Morton, quantity surveyor, 27, John Street, Sunderland.

May 9. Londonderry.—*Altering, repairing and making additions* to the Coleraine Courthouse, not to exceed £2,886, for the Proposal Committee of the C.C. Plans and specifications may be seen at County Surveyor's office, County Courthouse. Full particulars and conditions of tendering and forms of tender may be had from T. B. Adams, secretary to the County Council, County Courthouse, Londonderry. Tenders must be delivered on or before 4 p.m. on May 9.

May 11. Bristol.—*Alterations and additions* to the London and South-Western Bank, Bristol. Plans and specifications can be seen and quantities obtained at the offices of H. Williams, architect, Alliance Chambers, Corn Street, Bristol. Tenders to be sent to the Manager, London and South-Western Bank, Bristol, on or before May 11.

May 11. Blackburn.—*Erection of a new department* to Cedar Street Council School, to acommodate 280 children. Plans and specifications may be seen, and bills of quantities and forms of tender obtained at the office of Cheers & Smith, architects, 24, Richmond Terrace, Blackburn, on payment of £2 2s. Sealed tenders, on forms supplied, endorsed "Cedar Street Extension," to be sent to A. Gow, director, Education Office, Library Street, Blackburn, on or before May 11.

May 13. Bradford.—*Erection of baths and wash-houses,* Victoria Street, Bradford. Drawings may be seen, and specifications and bills of quantities obtained, at the office of the City Architect, Town Hall, upon payment of £3 3s. All cheques or postal orders are to be made payable to the order of "The Corporation of Manchester." Sealed tenders, enclosed in the official envelope, to be delivered at the above office not later than May 13.

May 13. Footscray.—*Erection of a new Council School* to accommodate upwards of 300 children in the Longlands District of Footscray, Kent, for the Kent Education Committee. Plans and specification, prepared by the Committee's Surveyor, may be inspected at the office of the Committee between 10 a.m. and 4 p.m. Any person desiring to tender and to receive copy of bills of quantities must send in his name to the Committee, accompanied by a deposit of £1, not later than noon on May 3. Tenders, on the forms supplied, are to be delivered to G. F. J. Goodes, "Leeds," Hamilton Road, Sidcup, not later than noon on May 13.

May 13. West Riding.—*Erection of the following works:*—Haworth new Police Station, Harden new Police Station, Knaresborough Courthouse (additions and alterations. Plans may be seen and bills of quantities obtained on application to the office of J. Vickers-Edwards, county architect, County Hall, Wakefield. A deposit of £1 is required in each case. Cheques, &c., must be made payable to the West Riding Treasurer, and sent to him direct at the County Hall, Wakefield, otherwise applications will not be entertained. Sealed tenders, properly endorsed, to be forwarded to the County Architect not later than 10.30 a.m. on May 13.

May 14. Cranbrook.—*Alterations at the Cranbrook Police Station,* ordered by the Standing Joint Committee. Persons desirous of tendering can obtain the necessary tender form at the office of the County Architect, 86, Week Street, Maidstone, between 10 and 5. The plan and specification of the work can be inspected at the Station daily between 10 and 5. Tenders not on the form provided will not be considered. Sealed tenders, endorsed "Cranbrook Police Station," to be received by C. Turner, clerk, Sessions House, Maidstone, not later than 6 p.m. on May 14.

May 14. Highfield and Birtley.—*Erection of new schools* at Highfield (near Rowlands Gill) and Birtley. Plans, specifications, and general conditions of contract can be seen, and bills of quantities obtained, as follows:—For Highfield School, at the office of Liddle & Browne, Prudential Buildings, Mosley Street, Newcastle-on-Tyne; for Birtley School, at the office of J. W. Rounthwaite, 13, Mosley Street, Newcastle-on-Tyne. Sealed tenders, endorsed "Highfield (or Birtley) Tender," are to be sent to A. J. Dawson, clerk to the Education Committee, Shire Hall, Durham, on or before May 14.

May 14. Southall.—*Construction of an underground convenience,* for the Southall-Norwood U.D.C. Plans and specifications may be seen and quantities and forms of tender obtained at the office of R. Brown, A.M.I.C.E., &c., engineer and surveyor, Public Offices, Southall, between 10 a.m. and 4 p.m., and on Saturdays between 10 a.m. and 1 p.m. Sealed tenders, in the envelopes supplied, and endorsed "Tender for Convenience," must be delivered to the Clerk of the Council not later than 4 p.m. on May 14.

May 24. Doagh.—*Erection of new church* near Doagh, for the Committee of Donegore Second Presbyterian Church. Plans and specification may be seen at the office of the Architect. Tenders to be lodged with W. D. R. Taggart, architect, 2, Wellington Place, Belfast, before 12 noon on May 24.

May 31. Abingdon.—*Erection of a manual instruction* and cookery centre at the Council School, Abingdon, Berks. Builders desirous of tendering are required to send in their names to the Secretary to the Education Committee, The Forbury, Reading, on or before May 7, together with a deposit of £2 2s., for bills of quantities, which will be supplied by post. Plans, specification, &c., will be open for inspection at the Education Secretary's office on and after May 10, between 10 a.m. and 5 p.m., Wednesday afternoons excepted. Tenders must be delivered at the office of the Education Secretary, on the form and in the envelope provided, not later than the first post on May 31.

May 31. Wokingham.—*Erection of a manual instruction* and cookery centre at the Wescott Road Council School, Wokingham, Berks. Builders desirous of tendering are required to send in their names to the Secretary to the Education Committee, The Forbury, Reading, on or before May 7, together with a deposit of £2 2s., for bills of quantities. Plans, specification, &c., will be open for inspection at the Education Secretary's office on and after May 10, between 10 a.m. and 5 p.m., Wednesday afternoons excepted. Tenders must be delivered at the office of the Education Secretary, on the form and in the envelope provided, not later than the first post on May 31.

No date. Brixworth.—*Repairs to the farm buildings* upon the Glebe Farm, near Brixworth Station. Apply for full particulars to G. Watson, Scaldwell.

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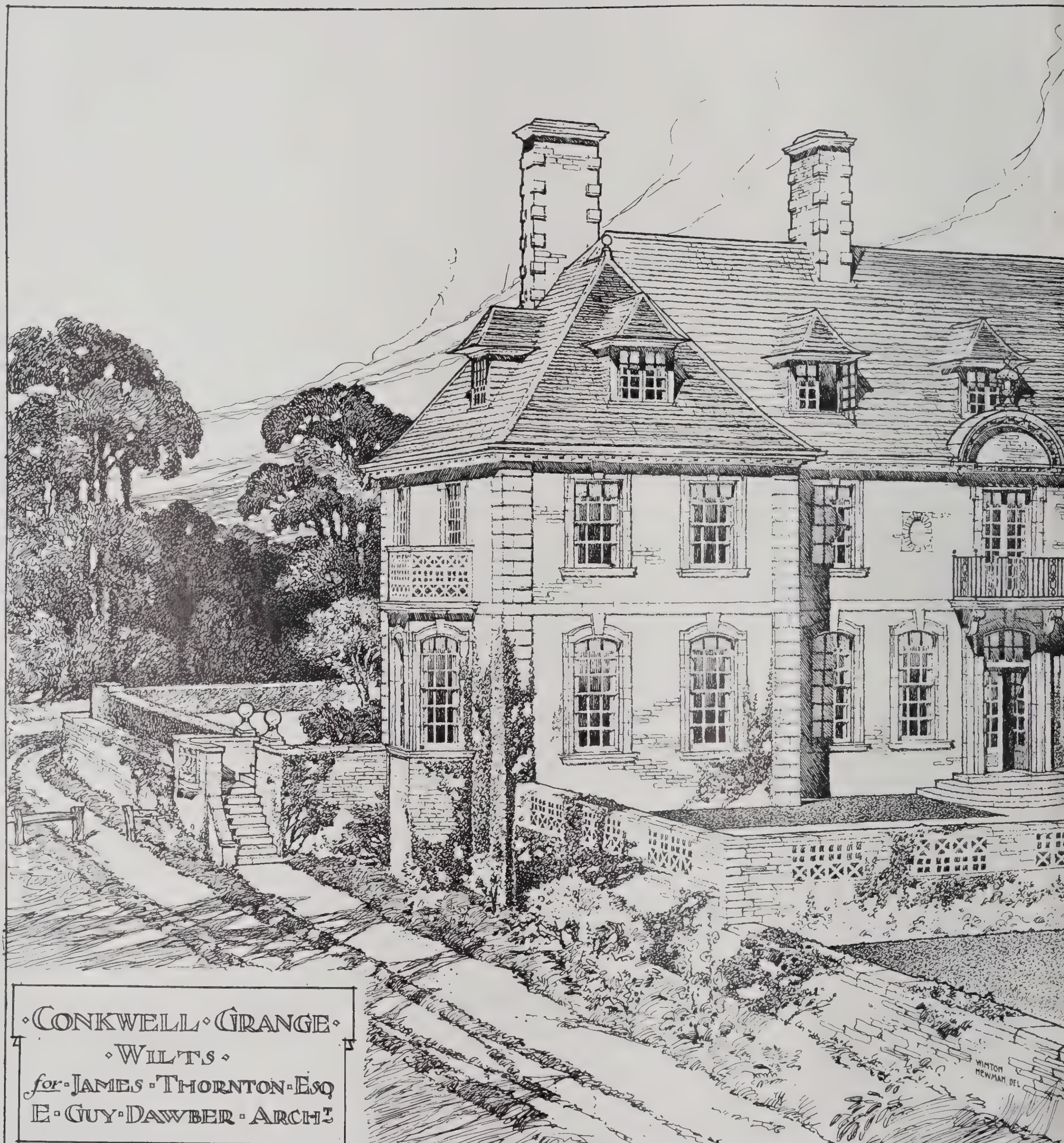
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, May 8th, 1907.



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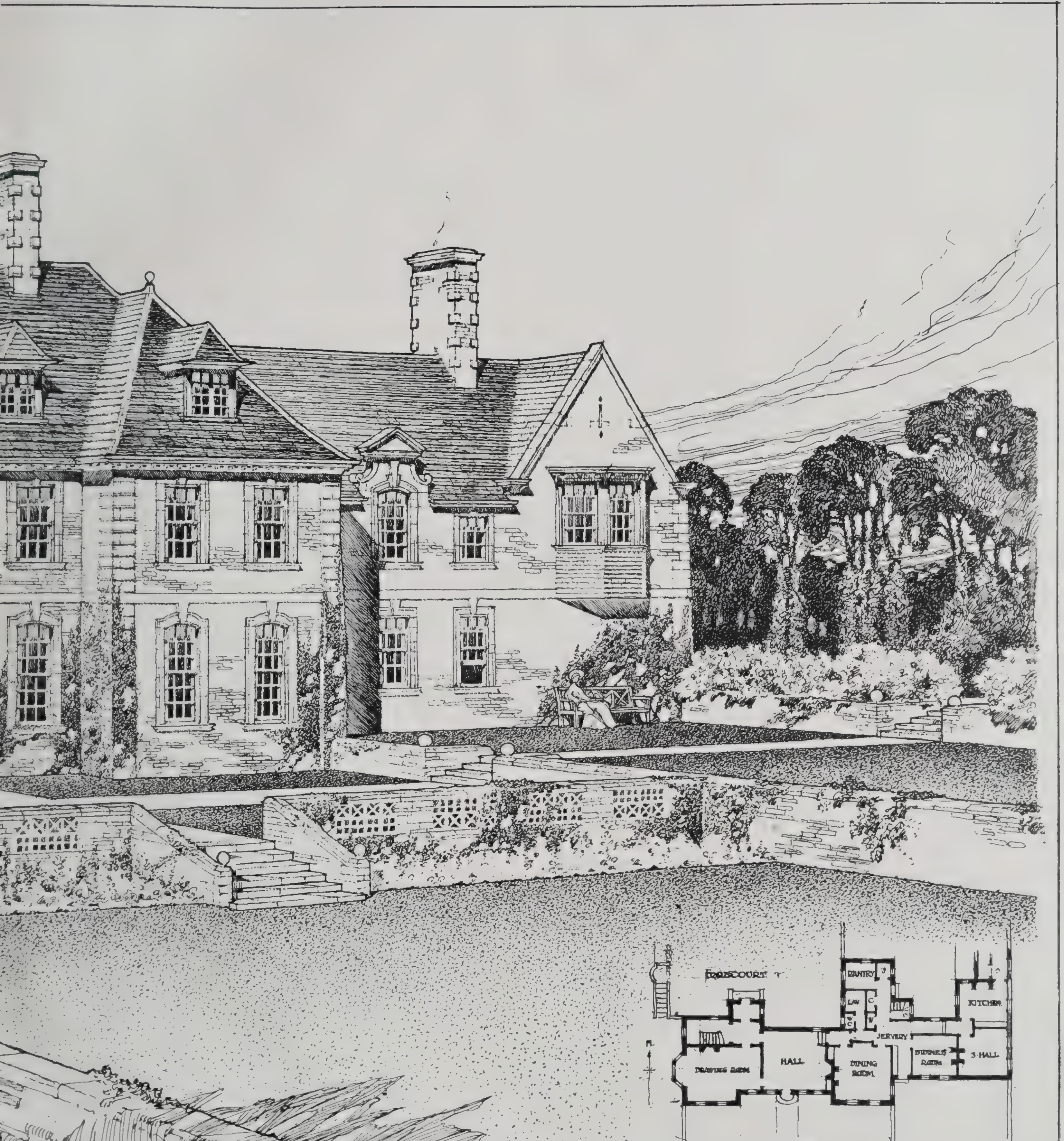
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May 8, 1907. Volume 21, No. 639

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

Notices.

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The "**Fire Supplement**" is given in this issue.

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The R.I.B.A. and Reinforced Concrete. At a meeting of the Royal Institute of British Architects to be held on May 27th, the report of the Committee on Reinforced Concrete will be presented. In regard to this it may first be mentioned that the Committee was appointed as a result of the increasing adoption of reinforced concrete in buildings, and with the object of laying down rules for the guidance of architects and engineers who may have occasion to adopt this new form of construction. The Committee consists of seventeen members, comprising architects and engineers whose opinions are well worthy of consideration, though they cannot be regarded as possessing a thorough practical knowledge of reinforced concrete construction. The constitution of the Commission of Reinforced Concrete appointed by the French Government was very different; all its members being experienced in practical work, as well as being engineers of great theoretical ability. Neither the Institution of Civil Engineers nor the Institution of Mechanical Engineers are represented officially on the R.I.B.A. Committee, though we are not much concerned about this, because Messrs. Walmisley, Collins, Cockerell, Colson and Marsh are members of the former body, and we doubt if the Institution could have improved upon such representatives of its profession. When the Committee was first appointed we objected to the exclusion of specialists, or those who have had considerable practical experience. Their knowledge the Committee has apparently not attempted to obtain, although it has elicited opinions from some persons, and certain members of the Committee have privately obtained information. However, we hear that the Committee has dogmatised on few points and has left the question fairly open. The endeavour will be made to lay down the requirements for sound work in reinforced concrete, insisting upon good workmanship and materials, and that specially skilled workmen shall be employed under careful superintendence. We believe the Committee has decided upon urging the desirability of including reinforced concrete among the recognised forms of construction, and the alteration of the by-laws so as to permit of its adoption. The Committee will suggest that 1½ins. to 2ins. of concrete, and in floor slabs 1in., is sufficient protection for the metal reinforcement against fire, and that all angles should be rounded or splayed to prevent spalling off under heat. This seems to us a fairly practical recommendation, but, of course, circumstances may require a greater amount of protection. The Committee, we understand, will stipulate that the metal used should be steel having an ultimate strength of 60,000 lbs. per sq. in., and an elastic limit of not less than 50 per cent. nor more than 60 per cent. of the ultimate strength. We cannot understand why this hard-and-fast rule should be laid down. Wrought iron is very serviceable in many cases. In putting concrete in position, the Committee will advise the layers not exceeding 3ins. before ramming. The recommendation should be confined to work done *in situ*. The Committee is in agreement as to the advisability of crushing tests being made beforehand on the concrete to be adopted, and will recommend that the strength of 1 : 2 : 4 concrete should be not less than 2,400lbs. per sq. in. at 28 days. It thinks test loads should not be put on structures before two months have elapsed, and that the test load should not exceed 1½ times the estimated imposed load. As regards methods of calculation, the important points the Committee had to decide upon were the safe strength of concrete in compression, in shear and adhesion, and of steel in tension, and the relation of the coefficients of elasticity for concrete and steel. The last-mentioned will be put at 15. The safe crushing strength of a concrete with an ultimate strength of 2,400 to 3,000lbs. per sq. in. after 28 days, we hear, will be given as 600 in beams and 500 in columns. The shear strength will be put at 60lbs., and the adhesion at 100lbs. per sq. in. The tensile strength of steel will be 15,000 to 17,000 lbs. per sq. in. The Committee therefore would seem satisfied with a factor of safety of two on the elastic limit of steel, and about four to five on the ultimate strength of the concrete. As regards the latter it is less conservative than some authorities abroad, but we are quite in agreement as to its efficiency if good workmanship is assured. A straight line stress-strain curve will be adopted. Prof. Unwin and Mr. William Dunn have supplied data regarding certain points in the theory of reinforced concrete, which the Committee is appending to its report. We hope to publish the report in full when it is presented, and our readers will then have the opportunity of carefully studying it in detail.

St. Paul's & the Sewer. We announced last week that the Main Drainage Committee of the London County Council considered it advisable to abandon the proposed route for the new sewer, which would pass near St. Paul's. The Committee submitted its report to the Council yesterday, finally stating that they had considered an alternative route by which the sewer would have taken a course longer than was originally proposed, at a greater distance from the Cathedral; and, as it appeared that the adoption of this alternative route would not detract from the efficiency of the sewer, but would obviate all question of damage to the fabric of the Cathedral, they thought that any additional expenditure which might be incurred would be justified, and they had therefore given instructions for the plans and specifications for the construction of the sewer to be amended accordingly. The sewer trouble having been got rid of, we are left with the fact that the present cracks are slowly spreading under existing conditions. It now devolves upon the Cathedral authorities to let the public know what remedy is proposed to be adopted.

ARCHITECTURE AT THE ROYAL ACADEMY.

The drawings of architecture at Burlington House this year are entitled to be considered the best collection exhibited for many years. The average quality of the work is far higher than we recollect in any recent exhibition, though it is true there is no work of altogether outstanding merit that can compare with some exhibited in former years. We hope that this high average is typical of the work at present being done in this country, though we are afraid that it is due to the superior judgment and greater care displayed by the architect member of the Hanging Committee responsible for the selection.

A reform has been urged for many seasons—namely, that the Academy should admit photographs instead of limiting views of buildings to drawings. We referred at length to the subject in a leader in our issue for April 24th, and it is unnecessary for us to repeat the arguments there used. It has also been pressed upon the Academy from time to time that the Architectural Room is too small. It seems to us possible that, if such a reform were effected in regard to photographs, the size of views submitted would be very much reduced, and the Architectural Room could therefore contain more. But it is doubtful whether this would be altogether an advantage, for when the building trade is slack, and a really careful selection is made, as at present, we feel that there is not much of importance missed. The drawings, although they possess much greater pictorial interest than photographs would do, if not such adequate illustrations of the actual work, surfeit one, and it is unlikely that the most zealous architect would spend even the time necessary to adequately study the works which are here exhibited. After all, we feel that if many of the works in the present exhibition were dispensed with, we should lose little of real architectural value, for many of the works, though inoffensive, possess no originality and are too small to be rendered important by reason of size. We cannot understand quite how 1552 and 1589 came to be admitted. The designs are very ordinary, while the drawings are the crudest we have seen for a long time. If the Academy is willing to overlook such drawings as these, there is no logic in the position of refusing to admit photographs. This exhibition serves to bring out most clearly two influences in modern architectural design, because retrograde movements have been more or less thoroughly eliminated. These two movements are in the direction of the application of later English Renaissance to modern public or semi-public buildings, and that staid domestic style which is the most vital sign of our time and which cannot be exactly assimilated to anything that has gone before.

In connection with buildings in cities and towns for commercial or public uses, a sad want of invention and originality is evident. The modern Victorian Renaissance, as it has been called, has this to be said for it, that it is generally inoffensive, but it is so severely proper, so self-conscious and so often fussy, that we really wish there were more architects who would dare to break the conventions and give us even crude buildings which evidence thought, rather than commonplace buildings which betray lack of invention. Almost every country house exhibited is restrained, neat, and typically English and modern.

As for ecclesiastical work, there seems to be no strong movement. The Gothic revival has left just a glimmer behind in some of the larger churches, which are somewhat too artificial. The small countryside or suburban church, on the other hand, is almost as vital as the domestic architecture. Several simple designs that seem exactly fitted to their surroundings are shown this year.

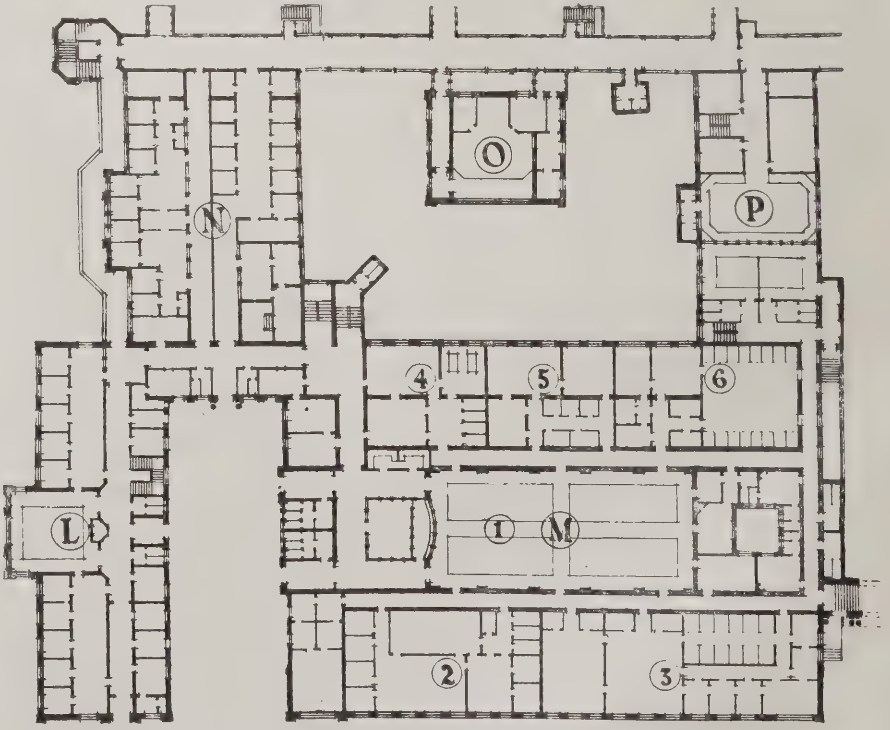
The whole of the exhibits in the Architectural Room consist of drawings. There are no models on exhibition; whether there were any submitted or not we cannot say.

Among the larger works, the most dominant feature is a number of designs for the Palace of Peace at the Hague by the following architects: John C. Carter (1489); Jan F. Groll (1495); Sidney D. Adshead (1496); John Belcher, A.R.A. (1501 and 1510); Harry G. Pearson (1502); E. G. Page and J. W. Halley (1513); A. J. Clifford Ewen (1514); Wills, Anderson & Cotman (1516); Henry T. Hare (1521); and Alfred W. S. Cross (1525). Both 1489 and 1495 are extremely poor. The latter is very much worse than the accepted design. No. 1496 is a good classic design, but the four towers at the corners are a little worrying. The interiors shown by Mr. John Belcher (1501 and 1510) are admirable examples of a strong design. No. 1512 is a very ordinary design, but No. 1513 is fairly good Renaissance design; No. 1521 is better, though like Nos. 1514 and 1525, it is rather too detached. No. 1516 is of the lumpy Egyptian Classic order. On the whole, however, the designs by English architects are much superior to the designs which obtained the favour of the assessors.

Sir Aston Webb, R.A., shows a detail of the central entrance to the Victoria and Albert Museum (1627), and with Mr. E. Ingress Bell, an elevation and a detail of the principal entrance of the new University of Birmingham (1619 and 1626). These drawings form a somewhat striking feature of the exhibits, but really they are not so important as they look. The size of the buildings, of course, is considerable, but the value of the work is small. The scale of the buildings is altogether inadequate, while the details are fussy, overloaded and crude.

Another striking exhibit is a very powerful design for the Catholic Cathedral Church at Westminster, prepared by Mr. Archibald Dunn in 1895 for Cardinal Vaughan. This cathedral design has been referred to on numerous occasions, and although Bentley's accepted design is in our opinion finer, undoubtedly this design by Mr. Dunn is a remarkable work. It has a fan vaulted roof of novel form. The fine drawing by Mr. T. M. Rooke helps it a good deal, but it is much superior to any of the Gothic designs submitted in the Liverpool Cathedral.

There is a type of Indian design which has been invented by European architects consisting of domes, towers and minarets that has no more real expression of modern conditions, modern Oriental thought, and of local conditions than modern English Renaissance design. This mistaken style is illustrated by Mr. O. Benston Hachard's proposed design for Government buildings in a tropical climate (1479). It is interesting to compare this with a remarkably successful design by Mr. Halsey Ricardo for a railway station at Howrah, Calcutta (1640). Another view of this building was shown in the Academy exhibition the year before last. The Oriental feeling, with the logic of all the details, sustains Mr. Ricardo's great reputation. Mr. Ricardo also has an interesting little drawing (1456) of his coloured glazed brick and faïence house in Addison Road, Kensington, but the drawing is a very inadequate representation of an extremely able design that is bound to have considerable influence upon the future development of architecture in London. The colouring of this drawing hardly suggests the real building at all.



KING'S COLLEGE HOSPITAL: CASUALTY AND OUTPATIENTS DEPARTMENT.

L, Casualty Department; N, Bath Department (Electrieal Department over); O, Operating Theatre; P, Dispensary Department; M, Out-patients Department (1, waiting hall; 2, surgical; 3, ophthalmic and skin; 4, gynecological; 5, medical; 6, ears and throat).

A somewhat interesting design by Mr. John Belcher, A.R.A., is to be found in No. 1511—namely, the façade to the principal entrance in Uxbridge Road of the Franco-British Exhibition which is to be held next year. We are glad to see that promoters are seeking the assistance of eminent architects for the design of exhibition buildings, a thing they have been for so long encouraged to do, but we only regret that such a poor start should be made, because it is not encouraging them to continue if they get such a frippery kind of thing as this, which is hardly an improvement upon the stuff we have so long been led to expect.

Town Street Planning.

Mr. A. E. Richardson exhibits a suggested architectural treatment for Waterloo Place, S.W. (1509). This is a typical French Renaissance design, which, although nice enough in its way, we hope not to see executed. Mr. T. E. Collcutt and Mr. Stanley Hamp's scheme for the formation of an embankment upon the Surrey side of the river, and the reconstruction of Charing Cross bridge for foot and carriage traffic, is a fine idea which ought to be carried out. We made the suggestion that the Charing Cross railway station should be removed to the other side of the river some time ago, and this is not the place to repeat our arguments; Mr. Collcutt's scheme, indeed, is a convincing argument in itself. The public-spirited enterprise in drawing up this scheme deserves every praise. It is almost too ideal to hope for, but it is not beyond the bounds of possibility.

Public Buildings.

Mr. Edward W. Mountford's Lancaster Town Hall (1534) is of simple English Renaissance type, with a large pediment supported on columns and a central tower.

An impressive view of Sir Brumwell Thomas's City Hall, Belfast (1512) sets the building off to the best advantage.

The accepted design for the Birmingham Council House by Messrs. H. B. Ashley and Winton Newman, as well as the premiated design by Messrs. Treadwell and Martin, and another design, are hung near each other (1649, 1650 and 1651). We reproduced the drawing of the accepted design in our issue for January 9th last; both this and the premiated design are good.

Mr. Arnold Mitchell's design for public baths at Selly Oak (1654) shows much more invention than is usually displayed in a classic design.

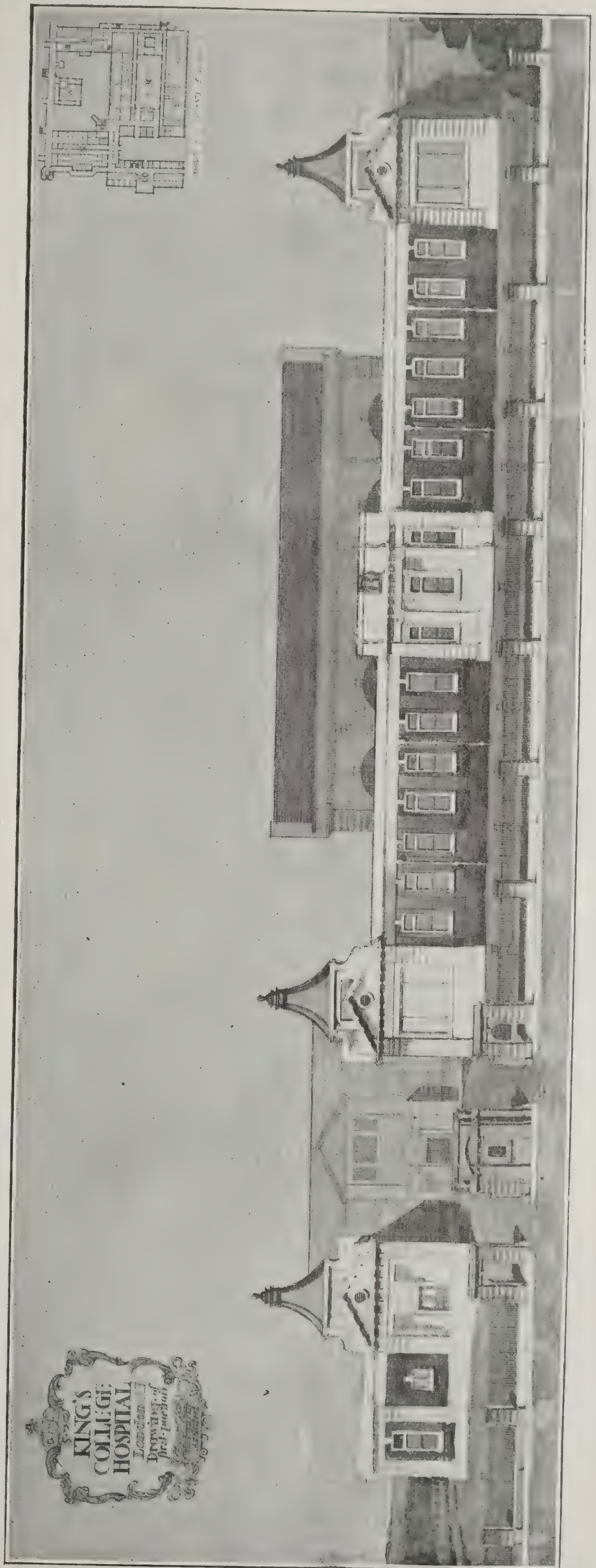
Mr. William A. Pite's Casualty and Out-Patients' Departments, King's College Hospital, Denmark Hill (1523) is an admirable treatment. We reproduce it on this page. Mr. Aylwin O. Cave exhibits an interesting line drawing of a simple and very pleasing design for a convalescent home at Glossop (1577).

Scholastic Buildings.

Mr. Charles H. Reilly's building for the Students' Union, University of Liverpool (1568) is a neat Classic building with large red-brick piers rising from a stone base.

The Johnston Technical School, Durham (1599) by Oliver Leason and Wood is picturesque if it is somewhat rambling; its position on the rising bank of a stream helps it greatly. No. 1488, St. Helen's School, Abingdon, by Mr. Frank L. Pearson, is a quiet design of the rambling type, without any imagination.

Mr. Edward P. Warren's new building of St. Giles's, Baliol College, Oxford



ROYAL ACADEMY EXHIBITION, 1907. WILLIAM A. PITE, F.R.I.B.A., ARCHITECT.

(1499) is a simple design, rendered by far too large a drawing for the importance of the subject.

A design by Mr. Charles S. Smith of "The Hall of Residence," University College, Reading (1477) is reserved, but the line of perspective by Mr. T. Raffles Davison is pretentious.

London's Civic Architecture.

Messrs. Ernest Runtz and Ford remind us by showing a line perspective, again by Mr. T. Raffles Davison, of the Strand corner of the Gaiety Theatre (1475), that we have seen this design illustrated in previous Academy exhibitions by other drawings. It is now getting rather stale.

Mr. Davison has also drawn Mr. Leonard Stokes' National Telephone Exchange in Gerrard Street, Soho (1478). This is a very ordinary design, giving the appearance of insufficient support below, but the real building looks much better than it does in the perspective.

Mr. Paul Waterhouse's new offices for the Royal National Pension Fund for Nurses, Buckingham Street, Strand (1487), is a colloquial Renaissance design that is too strained in feeling to be considered any improvement on the old buildings in the Adelphi. We can only look upon the replacement of Adam's work by such buildings as this with regret.

Messrs. E. W. Mountford and E. A. Greening exhibit a design for the new offices for the Northern Assurance in Lothbury (1463). This is an ordinary type of English Renaissance, unimaginative but staid and inoffensive.

We really do not know what has come over Prof. Beresford Pite. Some time ago he submitted a design in the Islington Central Library Competition having a strong suggestion of Greek Thompson's style, and his Assurance Office, Euston Square (1500), has the same Egypto-Greek manner. It does not possess the strength and imagination of Thompson, while it is duller than Cockerell's work, with however absence of proportion and feeling for detail. Altogether it is very uninteresting, except that it is regrettable to miss the Beresford Pite of old, whom we look upon as one of our most able imaginative architects.

Nos. 1579 and 1580 are two clever perspectives which illustrate to best advantage designs for city premises by Mr. Eustace C. Frere. The former is for a tall block of business premises in Lincoln's Inn Fields, that destroys the scale of surrounding buildings, but in itself is very fine. The other building is called St. John's House, in Queen's Square, and is a simple treatment quite in harmony with its surroundings.

Messrs. Waring's fine new premises in Oxford Street, W. (1618), by Mr. R. Frank Atkinson, is well shown by a large perspective, and the new building to be erected in Oxford Street for Messrs. Selfridge & Waring, in which Mr. R. Frank Atkinson is associated with Mr. D. H. Burnham, of Chicago, is a very fine austere scheme for what promises be a most worthy addition to London's commercial architecture. It is a pity that most other examples of commercial premises shown in this year's Academy are so very inferior, in no wise approaching either of these two above-mentioned buildings.

Mr. Reginald Blomfield, A.R.A., shows a good line drawing of his new building for the United University Club in Suffolk Street, Pall Mall (1470), a fine addition to London's modern architecture.

Domestic Architecture.

Mr. Blomfield also exhibits a simple Tudor manor house design, Wyphurst, Cranleigh (1464).

Mr. Ambrose Poynter exhibits (1457) a nice quiet Georgian house design for Polesden Lacy, near Dorking. Messrs. H. R. and B. A. Poulter have two drawings on exhibition, namely, a proposed hotel at Camberley (1460), and a residence at Camberley (1473); both designs belong to the best type of modern domestic work, for although the former is for an hotel, it can be included in the same category. The difference is obvious in the design, but the break is not so sharp as we are accustomed to see; Messrs. Poulter's solution of the problem is infinitely superior to the over-elaborated public-house type of hotel so customary. We shall reproduce these two drawings in our columns shortly.

Mr. Ernest George and Yeates exhibit a design for a villa at Antibes (1462), which is simple and embodies the right kind of feeling for the locality.

Further nice sedate house designs are: 1481 by Mr. William Ansell, 1518 by Mr. W. Aickman, 1527 by Mr. H. Inigo Triggs, 1529 by Mr. Walter R. Davidson, 1536 by Messrs. Warwick and Hall, 1546 by Mr. Edward J. May, 1561 by Mr. Henry Tanner, junr., 1578 by Mr. E. Guy Dawber (Conkwell Grange, Wilts, illustrated in this issue), 1592 by Mr. Horace Field and Simmons, 1593 by Mr. Andrew N. Prentice, 1632 by Mr. F. M. C. Martin, 1597 by Mr. Thomas E. Collcutt, 1695 by Mr. Edgar Wood (Thurlstone Vicarage, Yorks, reproduced in one of our issues some time ago), 1606 by Mr. Ernest Newton, 1611 by Messrs. W. A. Forsyth and G. P. S. Maule, 1612 by Mr. Geoffrey Lucas, 1630 and 1633 by Mr. Andrew N. Prentice, 1632 by Mr. F. Simpson, 1642 by Messrs. Niven, Wigglesworth and Falkner (house at Farnham, Surrey, which we shall reproduce shortly), 1645 by Mr. T. H. Mawson, and 1661 by Messrs. Wills and Anderson.

Interiors.

There are not many interiors shown, but one of the finest is the new dining-room at Normanby Park, Lincolnshire (1465), a Renaissance design by Mr. Walter H. Brierley, finely rendered in water colour by Mr. Charles Gascoyne, who has several drawings in the room, and whose work is unequalled by that of any other perspectivist on exhibition. Another good interior is the dining-room, Cheswardine Hall, Salop (1471), designed by Mr. Christian Eliot—an Elizabethan panelled interior, with a simple enriched drop ceiling. Mr. Percival T. Hildesley exhibits a good interior for a hall in the style of the Spanish Renaissance (1607). The same designer has an elevation of chimney-pieces in the same style and apparently for the same place in No. 1604. Mr. Thomas Johnson has a fine design for an inner hall in Elizabethan style, No. 1566. Another Elizabethan interior by Mr. Johnson is No. 1656.

Stained Glass.

There are several designs for stained glass. The majority of these belong to the old church type, and do not show any of the invention or originality to be wished for in other buildings. It is possible to render stained glass on broad lines with modern subjects in a modern way. Mr. J. D. Forsyth's design (1532), and Mr. Andrew Stoddart's frame (1549), of three designs having for subject a naval battle between England and Holland in 1652, are fine suggestions of what might be done, even if we object to some details of the compositions.

Ecclesiastical Architecture.

Mr. T. G. Jackson, R.A., shows five designs, namely, a proposed "Temple" speech-room at Rugby (1461), a new mission church, St. Augustine's, Aldershot (1551 and 1553), the interior of a new chapel at Hertford College, Oxford (1556), and a proposed enlargement of Aldershot Church (1557). The first-mentioned is in Mr. Jackson's well-known manner. The main church at Aldershot is a very interesting design. The interior shows a timber-supported roof that is an admirable solution of the problem. Nos. 1556 and 1557 we do not like nearly so much.

Mr. Temple Moore shows rather a fine perspective of All Saints' Church and Vicarage, Tooting Graveney (1490), evidently in the rich glow of the late afternoon sun, a very luscious piece of colouring that flatters an unobjectionable building.

A small drawing for the design of a church extension an Manchester by that clever architect, Mr. Edgar Wood (1493), has a weird but crude suggestion of the Bentley manner.

Mr. J. E. Dixon-Spain's proposed church, Cumberland (1526), is one of the best country-side designs shown this year. Another good type of small country church is that at Lythe, Yorkshire (1530), by Mr. Walter J. Tapper. The perspective looks like Mr. Charles Gascoyne's, but there is no signature; it is a fine treatment.

Mr. W. D. Caroë's St. Andrew and St. Patrick's Church, Elveden (1543), is of the ordinary uninteresting type, as is also Christ Church, Port Sunlight (1574), by Messrs. William and Segar Owen. Mr. Austin Durst's St. Paul's Church, Bushey, Herts (1540), is, however, a nice quiet design; we illustrate this in our issue for July 12th, 1905.

Messrs. G. Collinson and A. M. Cock show a fine simple classic interior for St. Mary's, Holly Place, Hampstead (1545).

A design submitted in Liverpool Cathedral Primary Competition by Mr. W. Henry Jewitt (1548), shows a portion of the nave overloaded with rich decoration, finnicky and fussy.

St. Hilda's, Crofton Park, S.E. (1558), by Messrs. F. H. Greenaway and J. E. Newberry, is a neat little suburban church design. Another equally interesting design by the same architects is for a new church and parish hall, Herne Hill (1643).

Another good church design is that for the English Church, Mauritius (1631), by Mr. Ernest Short.

The interior of the English Church, Florence (1575), designed by Mr. G. F. Bodley, R.A., is a worthy example of modern church design much aided by the perspective draughtsman, Mr. Charles Gascoyne. Mr. Bodley's other design (1572) shows the interior of St. Chad's Church, Burton-on-Trent. This has a wooden barrel roof. The red stone arcading is also impressive.

The U.F. Church, Coldstream (1590), by George Reavell, junr., is another simple design well rendered by a good line perspective.

An interesting original church design is the new Chapel for the Community of the Resurrection, Smithfield (1652), by the late Mr. A. H. Skipworth.

Mr. Roland W. Paul's Sarnesfield Church, Herefordshire (1660), is another admirable small countryside church, but the Church of All Saints', Berkhampstead (1662), by Messrs. C. H. and N. A. Rew, cannot be commended.

As regards Sculpture there is practically nothing for us to notice except the model for the base of an electric light standard by Mr. S. Nicholson Babb (1668). Apparently this is to be executed in bronze and presented to certain towns under the terms of the "Leighton bequest." This is a fair enough design in its way, but it is by no means remarkable. Why dolphins and small boys in the nude should for ever be associated with lamp standards we do not know. Dolphins were, of course, appropriate in the case of the lamps on the Embankment, and they would do for a seaside town, but it is regrettable that this design should be sent out by the Academy with its hall-mark as though it were perfection of design for a lamp standard.

Obituary.

Mr. C. E. Kempe, well known for his numerous stained-glass windows and other work in churches throughout the country, died on April 29th, in his seventieth year.

Notes on Competitions

Elementary School, Gorton, Manchester.

The award in this competition is as follows:—First, Messrs. Percy D. Lodge and A. E. Dixon; 2nd, Mr. Ernest Woodhouse; 3rd, Messrs. Mayor Brothers—all of Manchester. Eight architects were selected to compete out of 100 applications. Mr. Charles Hadfield, of Sheffield, was the assessor.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
May 11	GOLF CLUB HOUSE AT SOUTHPORT.—No premium. Particulars in last week's issue.
May 11	BUILDINGS FOR SCOTTISH NATIONAL EXHIBITION AT EDINBURGH.—Premiums of £100 and £75. Mr. J. J. Burnet, Assessor. Conditions from J. Marchbank, 45 York Place, Edinburgh. Deposit, One guinea.
May 17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk, Birkenhead. Deposit, One guinea.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
July 1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept. 11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN.—Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in last week's issue.
1908, March 31	MODEL COTTAGES, WOLVERHAMPTON. Particulars in last week's issue.

Correspondence.

Bishop Auckland School Competition.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—I desire to draw your attention to one or two inaccuracies in the report of this competition in your issue for April 24th. You state that the selected plans comply with the conditions. Such is not the case. In the first place, four classrooms accommodate 24 pupils only, instead of the 25 asked for. This is not much, except that the difference in the number materially affects the area of the classroom, arrangement of desks, and, in fact, the whole plan. Secondly, it was stated that the hall was to be of the required size (1,500ft. super.) for the proposed number of pupils (250), and capable of enlargement (2,400ft. super.) for the future number (400). This also governs the plan considerably. Thirdly, the lavatory and w.c. for the use of the head mistress was to be adjacent to her room. Does the premiated design show this? Among minor points I might mention the position of the assistant teachers' room on the first floor. Is this for supervision? I should say their work was chiefly on the ground floor, and such being the case, I suppose they had to be put "somewhere." This room (also the head-mistress's) has a fireplace, the coal being carried from the heating chamber in the basement through the main entrance! I see no other way. It was stated that the science block would be used as a night school. The only entrance at present is by means of the girls' school. Upon this and such details as emergency exits, service stairs, &c., comment is needless.—Yours truly,

COMPETITOR.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—The design placed first for the Bishop Auckland school complies as a whole with the conditions of the competition, and the four classrooms for 24 scholars in each, instead of 25, could hardly be taken as a vital departure from the conditions. "Competitor" is unreasonable in enlarging such a minor detail when he states the whole plan is materially affected by this change from the original conditions. This is not so, as a classroom for 25 would occupy a slightly larger area than one for 24—the former could also be left-lighted, and in this case would have more rows of desks; consequently a longer and narrower room, which might be overshadowed and would lengthen the hall to an unreasonable extent, for the sake of gaining one scholar in each of the four classrooms. The assembly hall is correct according to the replies to queries governing the conditions, as this room is "large enough for present requirements and can be readily enlarged for future extension" by removing the end wall and occupying the space marked "corridor" as future extension of hall, with gallery over. One could hardly complain of the position allotted to the lavatory accommodation for the head-mistress, as this is according to the requirements of the conditions. All the points raised by "Competitor" are trifling, and can easily be provided without seriously altering the arrangement of the plan. Mention was made in the critique to the fact that some of the rooms suffered in different ways to save cube contents. An important point overlooked by "Competitor" is the strong emphasis laid by the committee on the question of cost; "for plans which can be carried out at a small cost" was part of a large paragraph on this subject which has been taken seriously by the author of the successful design; this debarred such luxuries as service stairs, &c., particularly in a small girls' school where the major portion of the accommodation was provided on the ground floor, though a small service lift would be an advantage for groceries and coal. Taken as a whole, the plans placed first have the least number of serious drawbacks; while they are open to slight improvement in detail, yet the general arrangement meets the peculiar shape of the site, and the requirements of the competition have been observed in the spirit, though not so literally as "Competitor" desired.—Yours truly,

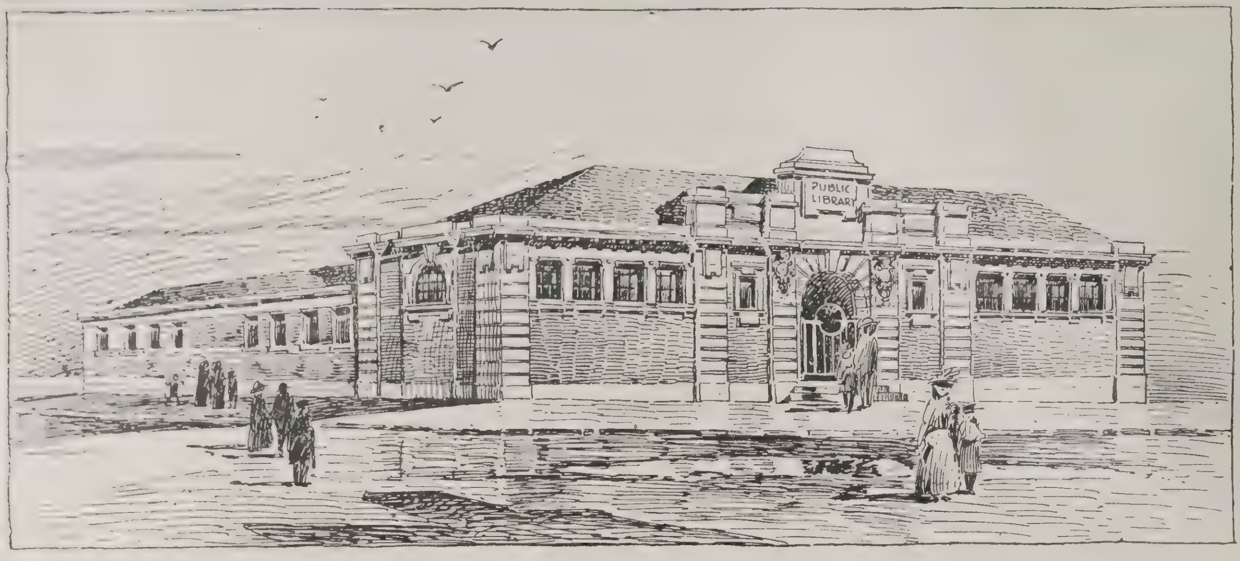
THE WRITER OF THE CRITIQUE.

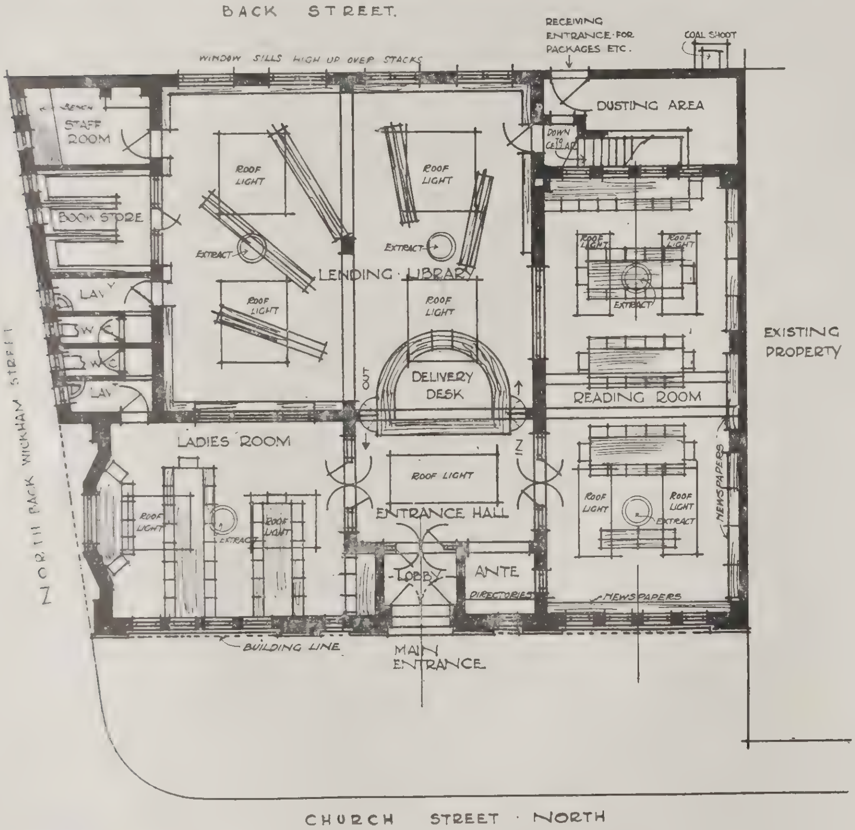
OUR COMPETITION.

In response to the offer of one guinea for the best two drawings for inclusion in our "Architectural Dis-Orders Competition," we received a large number of sketches. After careful selection we award the prize to Mr. William Brouard, of 23, Bernard Street, Russell Square, London, W.C., whose two drawings are given in this issue, Nos. 40 and 41, under "Building." There was only one prize offered, but as several competitors sent in drawings which showed that they had taken considerable trouble with them we are making some acknowledgment of this by forwarding copies of the current issue of "Specification" to the two competitors whose drawings may be considered as placed second and third—namely, Mr. F. W. Beech, of Exeter, and Mr. Henry S. Jardine, of Dulwich; the drawings submitted by the former are given under the "Architecture" section this week, while No. 42 in the "Building" section is one of the two submitted by Mr. Jardine.

A Presentation of a silver tea and coffee service was made on April 30th to Mr. Charles E. Whitehead, one of the managing directors of Messrs. C. C. Dunkerley & Co., Ltd., of Manchester, in recognition of his fifty years' service with the firm.

Liverpool Dock Site.—Considerable discussion took place at last week's meeting of the Liverpool City Council in regard to the new building for the Royal Liver Friendly Society—which is to be erected on the centre portion of the St. George's Dock site, adjoining the fine new building of the Mersey Docks and Harbour Board. The architect for the work is Mr. W. Aubrey Thomas, of Liverpool. Objection is raised to the disparity in size of the two buildings. The Dock Board building is 215ft. high to the summit of the dome, whereas the height to the summit of the proposed Royal Liver building would be 295ft. The point raised by the chairman of the Dock Board and by others was that the proposed Liver building, irrespective of its own architectural quality, would by its height and situation completely spoil the fine architectural effect of the Dock Board offices and "prevent the realisation of a beautiful combination of buildings on a site which offers peculiar facilities for adding a magnificent architectural feature to the attractions of Liverpool." By an overwhelming majority, however, an attempt to have the plans modified was defeated.





BRANCH LIBRARY, CHURCH STREET NORTH, SUNDERLAND: DESIGN PLACED FIRST. DAVIDSON AND CRATNEY, ARCHITECTS.

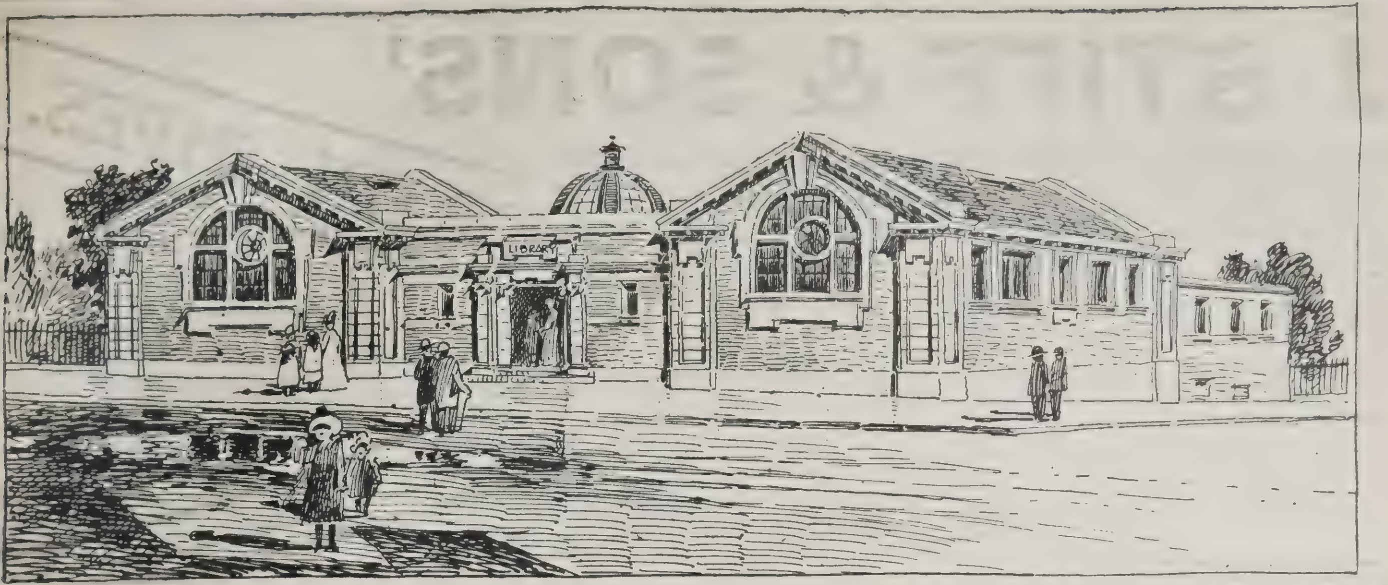
SUNDERLAND LIBRARIES COMPETITION.

We publish in this issue the designs placed first and second in the competition for the branch libraries to be erected at Villette Road and Church Street North, Sunderland. The successful architects in each case were Messrs. Davidson and Cratney, of Sunderland, who were also successful in the recent competition for the Annfield Plain free library, and were placed second in the Benwell library competition. Mr. J. T. Cackett, F.R.I.B.A., of Newcastle-on-Tyne, was the assessor in the Sunderland libraries competition, which was limited to architects practising in Sunderland. Forty-three designs were submitted, and all the drawings were on view from April 26th to 29th at the Town Hall, Sunderland. Premiums of £20 and £10 were awarded to the designs placed first and second—the former merging in the commission for each library. Judging by local comments the result has created some surprise, partly owing to the same firm securing the two second premiums as well as being placed first for both libraries; also because the Library Committee have not quite appointed the successful firm, who have undoubtedly secured the work on the merit of their designs. The plans here given are self-explanatory. An endeavour has been made to overcome the difficult shape of the sites, so as to secure rooms of good proportion and well adapted to their purpose. The exterior treatment is simple and suited for a small public building where cost was an important item. It is estimated that each of the libraries can be erected for £2,600, including the usual engineering items, &c., but exclusive of commissions to architects and quantity surveyor, and salary of clerk of works.

Views and Reviews.

Plumbing Work.

Books made up of a series of chapters contributed by specialists under the editorship of an architect seem to be quite the thing now. This book (the first part of which has just made its appearance) belongs to such category. It will deal with plumbing, sanitary work, gasfitting, electric lighting, bell work, glazing, &c., and will be contributed by sixteen specialists under the editorship of Mr. G. Lister Sutcliffe, A.R.I.B.A., whose "Modern House Construction," issued by the same publishers some years ago, will be recollected as a valuable work. In this first volume Mr. Sutcliffe contributes an introductory section consisting of several chapters. These deal with the work of the plumber, briefly glancing at the past, and following with notes on the properties, manufacture, &c., of the metals used by the modern plumber. This portion of the work is extremely well illustrated by means of photographs, showing, for instance, the manufacture of lead pipes, sheet lead, and enamelled cast-iron baths. Following this, alloys, marble, slate, pottery, glass, &c., cement, mortar and miscellaneous materials—such as indiarubber, putty, linseed oil, &c.—are dealt with. The second section, dealing with "The Elements of Practical Plumbing," is contributed by Mr. James Gammie, registered teacher of plumbing at the Craft School, Globe Road, E., and the L.C.C. School of Arts and Crafts, Camberwell, S.E. This is a very able contribution, dealing with the various tools used, the means of dressing lead, and the making of joints, bossing, &c. Mr. Gammie, however, treats ornamental lead work solely from the practical point of view in far too short a way. This branch of the subject is extremely interesting, and is capable of great extension. There is much valuable information which should be recorded in such a work. We hope that in subsequent volumes the matter may be repaired in some part by the chapters on the decorative treatment from the point of view of design. Section 3 deals with sheet-lead work, and is contributed by Mr. John W. Hart, R.P., Assoc.R.San.Inst. This is also an able division so far as the practical side of the subject is concerned, and in this there does not seem to be much missing.



We do not quite see, however, how ornamental rainwater heads can be legitimately included in this section. It certainly seems to us that such information should have been added to the chapter on ornamental leadwork by Mr. Gammie, the deficiencies of which we have already mentioned. A plate is included as a frontispiece giving portraits of Mr. John Tonge, Mr. J. Wright Clarke, Mr. George B. Davis, and Mr. A. B. Dyson, who are referred to as leading members of the trade. Short biographies are also given. This gives a personal interest to the work. Altogether the promise prepared by this first volume is excellent. When the work is completed it should be a valuable addition to treatises on the technics of building.

"The Modern Plumber and Sanitary Engineer," by sixteen specialist contributors under the editorship of Mr. G. Lister Sutcliffe. London: The Gresham Publishing Co., 34, Southampton Street, Strand, W.C., price 6s. nett.

Glues and Cements.

These two books have just been issued. The volume entitled "Glues and Gelatine" deals with the testing and examination of these two materials. The author is an American chemical expert, and he describes in detail the methods of American manufacturers. To some of our readers the information will be of interest, though the bulk of the matter is of too specialised a character to be of much practical use to them. The author points out that 80 per cent. of the glue-users in the United States "have but the vaguest conception of its properties, and are guided largely by the manufacturer or dealer in the selection of their supply. In the main, their confidence is not abused; but in many instances they are victims of unscrupulous salesmen." We suppose the same sort of thing might be said of glue-users in this country; but we fear the ordinary user will continue to buy his glue on trust.

The second of the two volumes before us is by an English author, and consists of a selection of receipts for all kinds of cements, gelatines, solders, &c. Among these recipes are included such as the following:—Cement for lavatory basins, cement for fixing metal letters to glass, indestructible putty, cementing putty for water pipes, cement for water tanks, compo for moulding pilasters, cornices, artificial marble, artificial stone, &c. The reliability of the recipes given is attested by the author, who says that he has proved them in his own practical experience.

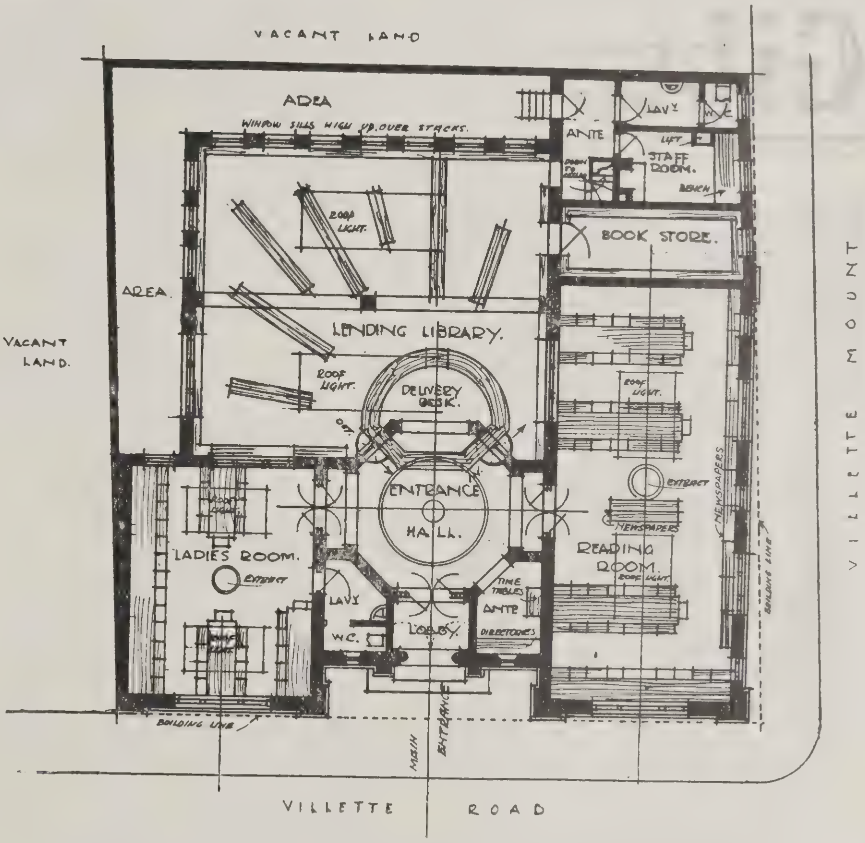
"Glues and Gelatine," by R. Livingston Fernbach. London: Archibald Constable & Co., Ltd., 16, James Street, Haymarket, price 10s. 6d. nett.

"Agglutinants of all Kinds for all Purposes," by H. C. Standage. London: Archibald Constable & Co., Ltd., price 6s. nett.

A Small Book on Surveying.

This little book on surveying is extremely cheap, and covers the subject in a very useful manner It is not intended to be a complete treatise on surveying, but rather to furnish such essential particulars as will suffice for all ordinary requirements of architects and builders. Most of the matter has already appeared in the pages of "The Illustrated Carpenter and Builder," the first six chapters being by Mr. Herbert Chatley, B.Sc., lecturer on civil engineering at the Portsmouth Technical Institute, and the remaining chapters (with the exception of one on making a sanitary survey) by Mr. F. T. Baines Hewitt, F.S.I., surveyor to H.M. War Department. The principles of land surveying are first described, and then follow chapters on the function and maner of using the chain, theodolite, &c.; angular measurement, setting out, and the surveying of a building site and house being then dealt with in a very lucid manner; and the remaining chapters devoted to surveys for the valuation of property, redemption of outgoings, dilapidations, &c. The book can be recommended as an excellent small treatise on surveying.

"Surveying," edited by Hugh B. Philpott, editor of "The Illustrated Carpenter and Builder." London: John Dicks Press, Ltd., Effingham House, Arundel Street, Strand, price 6d. nett.



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Haworth's Timber Measurer and Tables.

The 1907-8 edition of this little book has recently been issued. It is a very handy compilation, giving all manner of tables, prices of timber, rates of carriage, weights, &c., together with a number of useful explanations of timber-trade measurements, "standards," &c.

"Haworth's Practical Timber Measurer and Timber Buyers' Tables: 1907-8." London: Alfred Haworth & Co., Ltd., "Timber News," 84, Leadenhall Street, E.C., price 1s.

A new Edition of Fletcher's "London Building Acts."

A fourth edition of this book has just been issued by Mr. Batsford. The text has been thoroughly revised up to date, and full prominence given to the Amendment Act of 1905, with its fire-escape provisions, which came into operation at the beginning of this year. In view of these important new provisions, architects should obtain this new edition and put it on their shelves in place of the earlier edition.

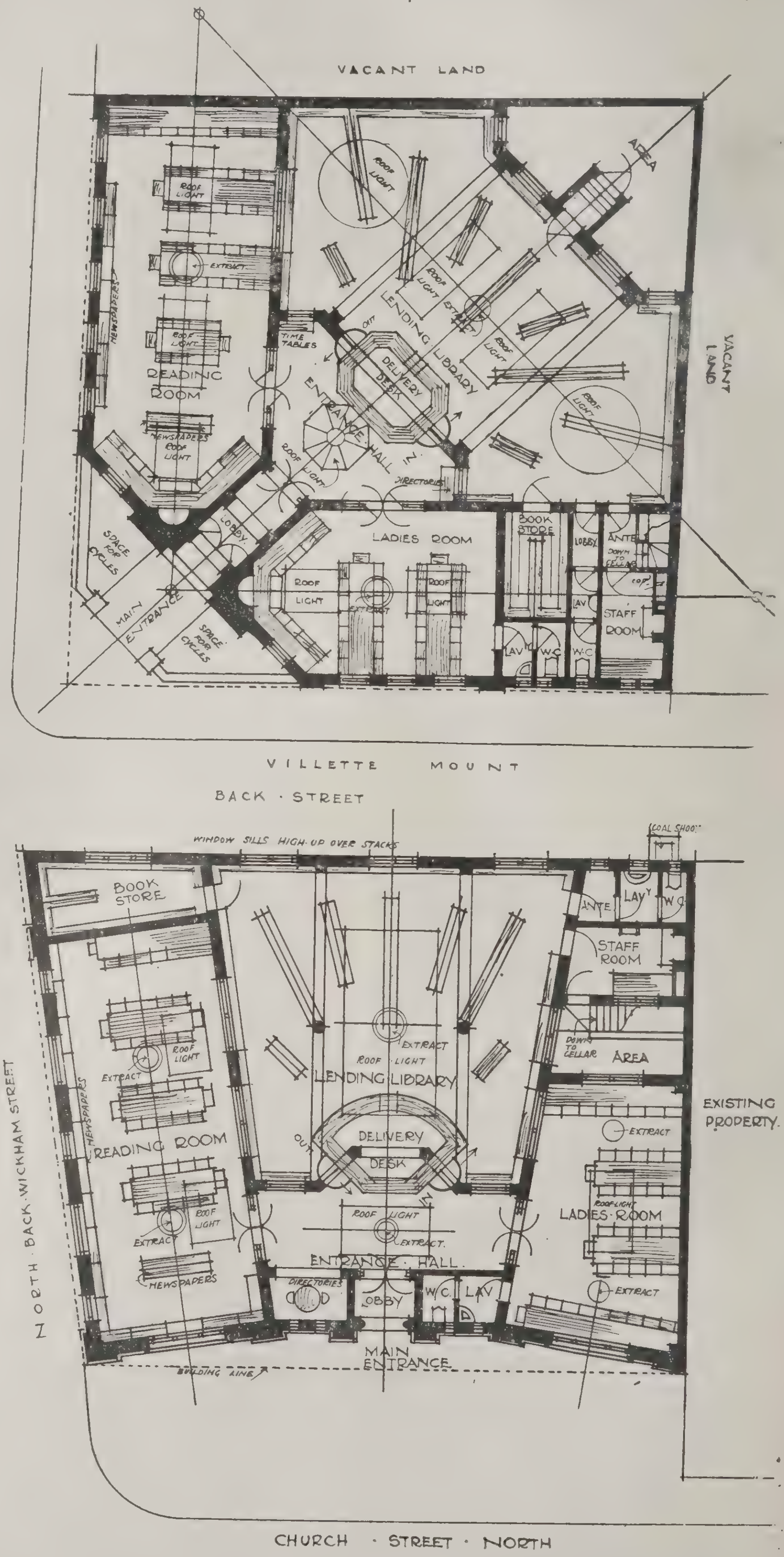
"The London Building Acts," by the late Prof. Banister Fletcher, revised by Banister F. Fletcher, F.R.I.B.A., F.S.I., and H. Phillips Fletcher, F.R.I.B.A., F.S.I.: fourth edition. London: B. T. Batsford, 94, High Holborn, W.C., price 6s. 6d.

Modern Buildings.

We have reviewed the first four volumes of this work on previous occasions, and we now have to review the concluding volumes—namely, 5 and 6. Vol. 5 is divided into four parts: (1) Ecclesiastical buildings; (2) armoured concrete and masonry construction; (3) the duties of the clerk of works; and (4) Australian planning and construction; while Vol. 6 is devoted to: (1) Miscellaneous buildings and their fittings; (2) builders' plant and scaffolding; and (3) South African planning and construction.

As regards the treatment of the subject of ecclesiastical buildings, the illustrations are the best part. The plans give a good deal of information. Of course, the book is of a very comprehensive nature, and space would hardly allow of a thorough treatment of any one subject. The same remark applies to the treatment of the subject of reinforced concrete, which is contributed by Mr. P. R. Strong. This again is well illustrated so far as the practical applications or systems are concerned, but it is by no means full. The theoretical treatment is rather sketchy, but is perhaps as much as we could expect in a work of this character. It is certainly quite inadequate to give anyone sufficient knowledge to design his own work. It only outlines the subject so that the architect might have a glimmering of the subject, to be able to appreciate the work of the engineer and conform to his requirements. There are many points that we could criticise, but the treatment is not important enough to warrant it. It is rather strange that the subject of masonry should be combined with that of reinforced concrete. The information provided is chiefly practical, written by Mr. Walter Hooker, and deals with the setting-out The illustrations are well drawn, and on the whole it is one of the best divisions in the book. Chapters on the duties of a clerk of works provide information which will be found really useful. As regards the chapters on Australian planning and construction contributed by Mr. R. J. Haddon, these are extremely interesting, but they seem somewhat out of place in this work. The differences of construction are not so considerable that they need all the space that is taken up. The South African planning and construction is dealt with by Mr. H. S. East in much the same way, though it is shorter and rather more to the point. Contributions might have been included on other colonies and also other countries. In the part devoted to miscellaneous buildings and their fittings the following have been dealt with: Assembly halls, theatres, inns and public-houses, hotels, stables, dairies, bakeries, libraries, laundries, fire stations, the decoration of domestic buildings, and internal domestic fittings. The information is, of course, short, but it is useful so far as it goes. Much of the matter on fittings is contributed by Mr. H. C. Quérée. The chapters on builders' plant and scaffolding are contributed by Mr. George Highton, and are fairly comprehensive.

"Modern Buildings, their Planning, Construction and Equipment: A Practical Work on all Matters Connected with the Building Trade," by G. A. T. Middleton, A.R.I.B.A. Parts 5 and 6. London: The Caxton Publishing Co., Clun House, Surrey Street, W.C. Price 10s. 6d. nett per volume.



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Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.
The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.
Correspondents are particularly requested to be as brief as possible.

Size of Rainwater Storage Tank.

W. writes: "Can you refer me to any recognised precedent establishing the correct capacity for a rain-water tank in relation to the area of roof supplying it? A cottage recently erected in a country district, upon high ground, where the cost of a well is prohibitive, has a cemented underground tank of 3,000-gallons capacity, upon which the occupants would depend for their water supply. The area of the ground covered by the roof is 411 sq. ft., and a rainfall of 30ft. per annum would produce 6,500 gallons, or about 15 gallons per day (say 5 gallons each for 3 persons.) The rural district council have no by-laws, but refuse to grant occupation certificate required under section 6 of the Public Health (Water) Act, 1878, unless the owner of the cottage makes provision for storage of 6,000 gallons. This appears to me to be totally disproportionate to the area of the roof, and that the expense of duplicating the existing 3,000-gallon tank would be entirely thrown away, unless occupation be deferred for six months whilst 3,000 gallons accumulate, which has not been suggested."

The requirement of the rural district council is absurd. The horizontal roof area being 411 sq. ft., and the mean annual rainfall 30ins., the total supply per annum will be $\frac{30}{12}\times411\times6\frac{1}{4}=6{,}422$ gallons. Of this, at least, 10 per cent. will fall in such small quantities as not to reach the tank, and another 10 per cent. should be allowed to run to waste to wash the roof and gutters. This will leave $6{,}422-1{,}284=5{,}138$ gallons. But the consumption will be going on at the same time, so that 3,000 gallons storage capacity ought to be more than ample, representing, as it does $\frac{3{,}000}{5{,}138}\times12=$seven months' collection. Many cottages have to rely upon a 72-gallon water-butt for their storage, and, from personal observation in the suburbs of London, 1-gallon storage capacity for each square foot of collecting area provides sufficient space to take practically the whole fall in an average year when it is being used at the same time. If the council are obdurate, a solicitor should be consulted. HENRY ADAMS.

Giffnock Stone.

BELFAST.—X. writes: "Please give names of any good quarries producing Giffnock stone besides Messrs. Baird and Stevenson, Old Giffnock Quarries and Hunter's Hill."

Besides Messrs. Baird and Stevenson there is another company—namely, the Giffnock Quarries, Ltd.—which is working a large section of the Giffnock quarries, and is likely shortly to assume (under a lease commencing at Whit Sunday next) the whole of these quarries. We understand that Messrs. Baird and Stevenson will dispute their right to eject them at Whit Sunday, so that there may still continue the two companies working Giffnock stone. The Giffnock quarries are situated a mile or two south of Glasgow, and the Hunter's Hill quarry, to which you refer, is situated a mile or two to the north of Glasgow, and is worked by Messrs. Thomas Gibb and Sons, Ltd. This Hunter's Hill quarry is the same as the old rock that was known as Kenmure stone, and is of equal quality with the Giffnock stone.

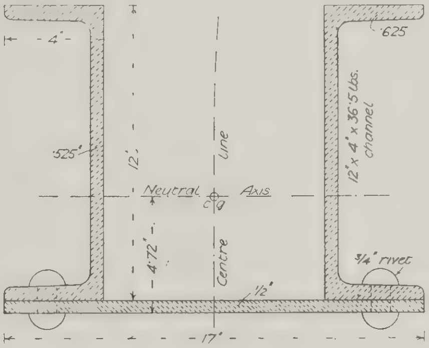
Examination Questions.

ROCHDALE.—A. C. S. writes: "A building 30ft. wide has its wall perpendicular to two side walls which are 54ft. and 64ft. long; the roof has a pitch of 30 degrees and is hipped at each end. Draw to scale the length of hip rafters and angle of hip rafters by means of plan."

This is evidently an examination question. We cannot undertake to answer such questions in these columns, which are primarily intended to assist readers in difficulties arising in their everyday practice.

Neutral Axis in Trough Girder.

MANCHESTER.—XX writes: "Referring to sketch (re-drawn), is 4·997ins. the correct distance of the centre of gravity from the assured axis? If incorrect, please show in detail the correct method of calculation. The section is compounded of two 12 × 4 channels, No. 26 in List 7, 'Properties of British Standard Sections.' The sectional area of each channel is given as 10·727ins., and flanges $\frac{5}{8}$in. thick; rivets, say, $\frac{3}{4}$in. diameter, holes, $\frac{13}{16}$in.; plate riveted to bottom flanges, 17 × $\frac{1}{2}$ins."



The neutral axis will be at the centre of gravity of the whole section as shown, neglecting the rivets, which do not affect the question. The calculation will be

$$\frac{10{\cdot}727\times2\times(6+\frac{1}{2})+17\times\frac{1}{2}\times\frac{1}{4}}{10{\cdot}727\times2+17\times\frac{1}{2}}=$$

$$\frac{139{\cdot}451+2{\cdot}125}{21{\cdot}454+8{\cdot}5}=\frac{141{\cdot}576}{29{\cdot}954}=4{\cdot}72\text{ins.}$$

HENRY ADAMS.

St. Mary's Church, Beverley.

EXETER.—INTER writes: "I have a detail of some carving from the west doorway of St. Mary's Church, Beverley, on a sheet of medieval ornament for the R.I.B.A. intermediate examination. Can you tell me the dates and any other particulars as required to accompany the drawings? I have the necessary sketches."

The following is an outline of the history of the church of St. Mary, at Beverley:—Ample architectural evidence shows that a church existed as early as the 12th century, although there is no documentary evidence of it until the 14th century. The inner archway of the south porch probably dates from the early years of the 12th century, while of somewhat later date are the hood mouldings of the arcade on the east side of the north transept. The remains of the Early English period show that the church must have been of very considerable size. To the 13th century belong the arches between the nave aisles and the transepts and the outer piers supporting them, the arches on the east side of the north and south transept. Those in the north transept date from about 1190, while those in the south transept are a little later. These arches stand upon Perpendicular piers, the arches probably being rebuilt into the new works about the middle of the 15th century. These arches may have been rebuilt after the fall of the church in 1513, but the evidence of rebuilding is scarcely as strong in the transepts as in the nave. The jambs of the arch on the porch side of the inner doorway of the south porch are also of this period. The vaulted crypt under the large chapel on the east side of the north transept, and the two-light windows on the north side of the chapel itself, are of the Early Decorated period (1245-1315). The whole of the lower part of the chancel, together with the beautiful chapel in the north aisle and the chantry chapel adjoining it, belong to the Curvilinear or Late Decorated period, being commenced about 1320. The fine west front dates from the early years of the Perpendicular period. The nave dates from the first half of the 15th century. The label stops of the clearstory windows on the south side, and the windows themselves, date from the first half of the 15th century, and are certainly not later than 1450. The label stops of the respond piers of the south arcade bear the date 1524. The presence of inscriptions and figures, bearing the date 1524, in the Early Perpendicular nave is explained by an inscription on an oaken pew recording the fall and rebuilding of the church. Further information regarding the history of St. Mary's, Beverley, may be gained from an historical note contained in "Beverley Minster," by Charles Hiatt, published by George Bell and Son, London, 1898, and from a pamphlet entitled "The Two Beverley Churches," published by A. Brown and Sons, Hull, 1890.

H. Y. M.

Removal of Trees on Green.

DOVERCOURT.—X Y Z writes: "In our parish we have a common green, unfenced, on which a considerable number of trees for years past have been deposited for seasoning before being cut by sawyers. The lord of the manor now says these must be removed. Can he compel the owners of the trees to remove them?"

If the unfenced land forms part of "the waste" of a manor there is no doubt whatever that the lord of that manor may insist upon the removal of the trees. The freehold of the land is vested in him, subject only to the rights of common, &c., &c. (if any) enjoyed by "tenants of the manor." I suggest that the owners of the timber pay a small rental for their encroachment, and so settle the matter.

F.S.I.

Manchester Society of Architects.—At the recent annual meeting of this Society the present membership was given as 257. With regard to the legacy of £8,000 from the late Mr. A. W. Mills, it was stated that the advisability of creating a trust in regard to some portion of the money was under consideration.

R.I.B.A.

Annual Report.

The annual general meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, London, W.

The annual report of the Council for the year 1906-7 was presented.

The present membership was returned as 2,162, comprising 862 Fellows, 1,254 Associates, and 46 Honorary Associates. The number of probationers now stands at 2,707, and students at 879.

London County Hall Competition.

In reference to this the Council state that the L.C.C. drew up the conditions on the lines of the R.I.B.A. suggestions, but several important modifications were made, and the details embodied in the conditions which were finally issued were not submitted to the Institute Council. In their original suggestions the Institute Council did not contemplate an International competition, but, acting on the advice of the Competitions Committee, refrained from making any representations on the subject when the intention of the L.C.C. became known. The Institute Council were not consulted in any way as to the selection of the eight architects invited to take part in the final stage of the competition, though at the suggestion of the Institute the L.C.C. extended the time required for the preparation of drawings to nine months, six of which are devoted to the preliminary stage. The Institute Council have addressed a communication to the L.C.C. protesting against the appointment of their official architect in the dual capacity of assessor in the competition and joint architect to the building.

Strand Improvement.

The Council regret that the repeated submission of their views to the L.C.C. in regard to this improvement resulted in the final communication of the L.C.C. declining to reconsider their decision as to the line of frontage on the north side of the Strand between the churches of St. Mary and St. Clement Danes.

District Surveyors.

On April 22nd a deputation from the Institute Council laid before the Building Act Committee of the L.C.C. their views as to the status of district surveyors, urging a return to the practice of appointing practising architects of high standing.

Workmen's Compensation Act, 1906.

The Council have taken counsel's opinion as to the operation of the Act as between (1) architects and clerks of works, (2) architects and assistants, (3) architects and pupils, (4) building owners and architects. Their opinion will be published in the R.I.B.A. Journal.

Ulster Society of Architects.

This society, having severed its alliance with the Royal Institute of the Architects of Ireland, applied for alliance with the R.I.B.A. In view, however, of the protests raised by the Irish Institute, the Council deemed it advisable to defer consideration of the application until such time as the Irish Institute and the Ulster Society might come to an amicable understanding.

Peace Palace Awards.

The Council have had before them an invitation from a Dutch committee to cooperate in a movement of protest against the awards in the competition for the Peace Palace at The Hague, but declined.

Seventh International Congress of Architects

The Council have pleasure in reporting that this was financially successful. The Executive Committee have a balance of nearly £600 in hand for the printing, &c., of the *Compte Rendu*, or Volume of Transactions of the Congress. This will be issued shortly to members of the Congress.

Charter Revision.

The special committee entrusted with the preparation of a revised Charter and a Bill to Parliament for submission to the General Body are now in the midst of their labours.

Board of Architectural Education.

The University of Liverpool, after conferring with representatives of the Board, have arranged to confer a Degree in Architecture, to be entitled "B.Arch."

The Board also call attention to the fact that the University of London has instituted a B.A. degree in architecture.

A syndicate for the consideration of a School in Architecture and a diploma was appointed by the University of Cambridge, and invited the Council of the R.I.B.A. to nominate delegates. Sir Aston Webb, Mr. Reginald Blomfield, Mr. Alfred W. S. Cross and Mr. John Slater were nominated, and attended a meeting of the syndicate at Cambridge, where they expressed their views as to the proposals submitted.

In view of the discrepancy that appears between the R.I.B.A. examination papers and the syllabus of the Board, the Board have requested the Council of the R.I.B.A. to appoint a joint committee of the Board of Architectural Education and the Board of Examiners to consider their relations and the nature of the examination papers.

A sub-committee of the Board has been appointed with a view to obtaining diagrams of standard examples of doors, windows, domes, vaults, &c., for use in the various schools. A form of certificate has been approved by the Board, and is now granted to students.

Finance.

The Council have the pleasure to report the continued financial prosperity of the Institute, and to point to a balance of £1,436 of income over expenditure, which is gratifying in view of the extraordinary expenditure of £631 in connection with the International Congress. It is due in great measure to the increase in membership. The sum of £3,000 has been invested this year, thus bringing up the invested capital of the Institute to £21,000.

Art Standing Committee.

Among other matters reported on by this committee were the following :—

Charing Cross Roof.—The conference between Sir Benjamin Baker and Mr. Tempest, engineer to the South Eastern and Chatham Railway, and the Art Committee had the satisfactory result of modifying the official proposals with regard to the treatment of the wind screen of Charing Cross Station. The work was brought into harmony with those recommendations, and the effect may be regarded as a distinct improvement on the original proposal.

Government Offices.—The design of the detail on the square towers at the Government Offices in Whitehall was dealt with from the point of view that it appeared inconsistent with the work characteristic of the late J. M. Brydon. Sir Henry Tanner kindly informed the committee that the executed work was carried out with the sanction of the Advisory Committee. He further added that the small scale, the half-inch, and the perspective drawings all differ from one another.

Selby Abbey.—The committee shared in the general feeling of regret at the destruction of Selby Abbey. Various proposals for restoration were brought to their attention, and the architect for the work was communicated with. Mr. Scott was good enough to forward a copy of his report upon the proposed works at the Abbey, which was of a generally satisfactory nature.

Holyrood Chapel.—The proposal to restore and rebuild Holyrood Chapel was condemned, and the committee resolved to ask the Institute Council to write to H.M. Office of Works in Scotland to protest against any such undertaking. It is gratifying to know that the proposed restoration has been abandoned.

London Improvements.—The committee now have under consideration a scheme dealing with prospective public improvements in London with a view to assisting the promoters of such work with suggestions which will aid in obtaining a continuity of artistic development throughout the metropolis.

The Practice Standing Committee.

Revision of the Institute Scale of Charges.—This has been completed by the committee and sent up to the Council, before whom it now lies.

Institute Form of Contract.—The committee have devoted much time to the consideration of the present form of building contract, in the light of certain legal decisions, notably those of *Robins v. Goddard* and *Goddard v. Ferguson.* As the result of representations made by the committee and a suggestion that the necessity for alteration of the terms of the contract in the interests of all parties had been shown to exist by the findings in those cases, the committee were invited to draw up a report. This was done, and, upon the recommendation of the committee, the Council have instructed them to prepare a statement in order to obtain counsel's opinion for its assistance in considering the committee's report. The committee are now, therefore, proceeding to prepare the statement.

Modification of Country By-laws.—At the request of the Council the committee nominated three members to sit on a joint committee of the Art, Science and Practice Committees to consider the modifications of the by-laws as proposed in "A Bill to Amend the Public Health Acts," now in the House of Commons, and "The Public Health Amendment Bill," now in the House of Lords.

London Building Act, 1894.—The Council referred to the Committee an invitation from the London County Council to the Institute to confer with them upon a suggested revision of Schedule 1 of the Act. The committee are now awaiting fuller information from the L.C.C.

Science Standing Committee.

This committee report that the variations proposed in the Portland cement specification are still under consideration. The standard specification for cast-iron pipes has been published.

A committee has been appointed to draw up a report on the composition of mortar, and a programme of tests has been prepared.

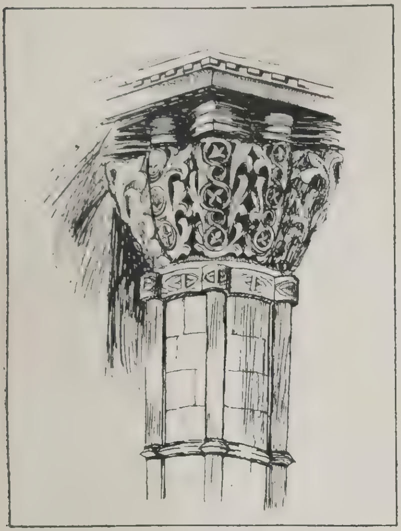
A committee has been appointed to consider the amendment of the building by-laws in force in this country.

A committee has been appointed to draw up a report on modern methods of dealing with the sewage of houses where no sewers are available.

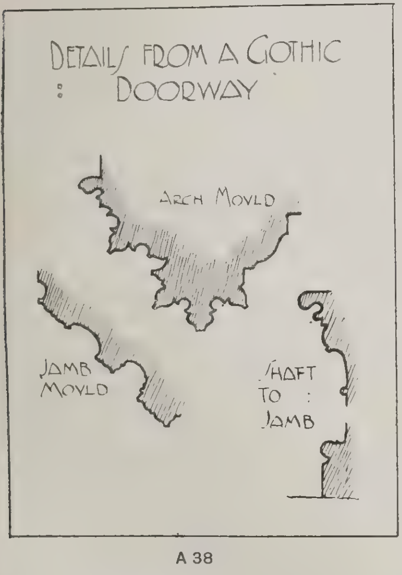
ARCHITECTURAL DIS-ORDERS COMPETITION.

(Fourteenth Series.)

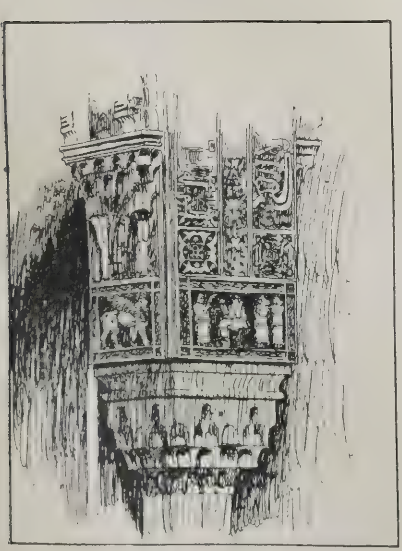
CLASS A (ARCHITECTURE).



A 37



A 38



A 39

This competition has been instituted with the object of increasing the circulation of The Builders' Journal by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Prize.—£10.

And twenty-four other prizes—cases of instruments &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

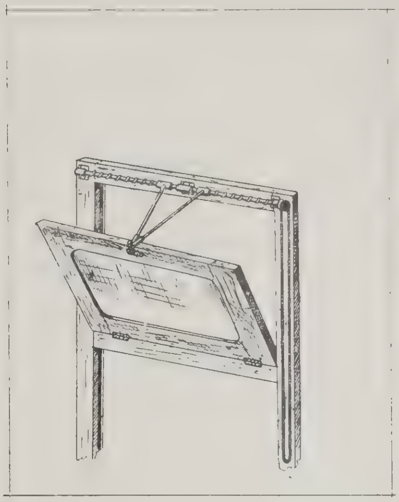
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of The Builders' Journal, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of The Builders' Journal, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

(For Coupons see page vi.)

Copies of "The Builders' Journal" *containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

CLASS B (BUILDING).



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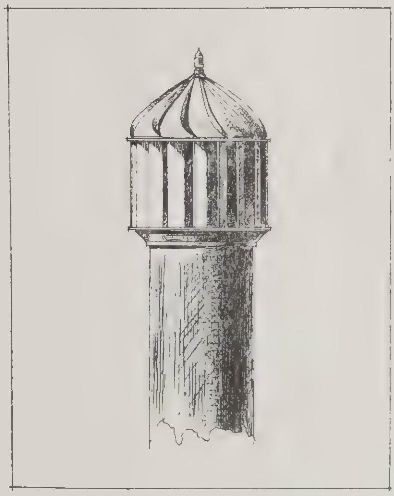

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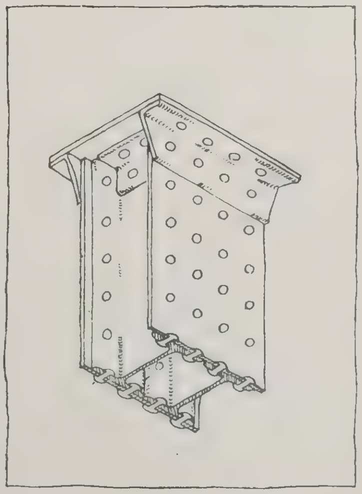

42

A.A. DINNER.

The Architectural Association held its "members' annual dinner" at the Gaiety Restaurant last Friday, with Mr. Walter Cave in the chair. The outgoing president, Mr. R. S. Balfour, was unable to be present, being still in the doctors' hands.

Mr. Arthur Keen proposed the toast of "The Royal Institute of British Architects." He spoke of the kindly character of the connection between the Institute and the Association—not only in the form of the annual cheque which the Association received (and which they had no difficulty in spending), but also the great help given by the most eminent members of the profession in the Institute ranks. With this toast he associated the name of Mr. Leonard Stokes. Mr. Stokes said he felt somewhat out of place, because he thought the traditions of the Institute required an old fogey to respond, and he was there doing the duty of an old fogey, when he still considered himself to be an active member of the Association. He was forced to take the part of the heavy father, when he would rather be one of the young men. He thought the friendly relations existing between the two bodies was more beneficial to the Institute than to the Association, for the Association was their recruiting body, and the future of the Institue was largely in the hands of the Association.

Mr. W. J. Locke proposed the toast of "The Association." He would not venture on a consideration of its present position, because he was not well acquainted with the matter; but these things filtered through, like a current of warm air, to the colder regions of 9, Conduit Street. He thought the greater the difference of tone between the two societies the better for Architecture. The Association was a league of youth and of enthusiasm, red-hot in the courage of half-formed opinions. Its aims were different from those of the Institute, which the Charter and Mr. Keen had so genially defined. Theirs was a policy of mutual aid and encouragement, and he could not help contrasting the privileges of those who followed the arts of Architecture, Sculpture, and Painting with the lot of artists in Literature, who had to pursue their studies in seclusion, and produce their art for the unintelligent criticism of maiden aunts and ineffectual sweethearts.

Mr. Walter Cave, responding, referred briefly to the strong position of the Association, which had now 1,764 members—an increase of 100 over last year—and the growth of their social side.

Mr. Henry Tanner, jr., proposed "Our Guests," Mr. E. A. Abbey responding.

Finally, Mr. Raffles Davison proposed the health of Mr. Driver.

Our Plate

Conkwell Grange, Wilts.

This house is about five miles out of Bath, on a beautiful site overlooking the river Avon. It is built of old stone got from the site around; the roof is also covered with old stone slates. The dressed stone used is from the Ridge Quarry of the Corsham Quarrying Co. Mr. E. Guy Dawber, F.R.I.B.A., of 22, Buckingham Street, Strand, W.C., was the architect, and Messrs. Walker and Slater, of Derby, were the contractors.

Current Market Prices.

METALS.

Standard Copper	per ton	105 0 0	106 0 0
Do. Strong sheets ...	do.	120 0 0	121 0 0
Lead, soft foreign	do.	20 0 0	20 5 0
Do. English	do.	20 12 6	20 15 0
Do. pipes...	do.	23 10 0	23 15 0
Do. sheets	do.	23 0 0	23 5 0
Galvanised Corrugated sheets	do.	13 15 0	14 0 0
Spelter G. M.	do.	26 0 0	26 5 0
Angles, Scotland	do	7 0 0	7 5 0
Bars, do.	do.	7 17 6	8 0 0
Marked bars, Staffs. ...	do.	9 0 0	9 2 6
Common bars, do. ...	do.	7 0 0	7 5 0
Angles, M'boro.	do.	7 0 0	7 2 6
Joists do.	do.	6 15 0	6 17 6
Angles, Midlands	do.	7 0 0	7 5 0
Joists do.	do.	7 5 0	7 7 6
Girder plates, Midlands ...	do.	8 0 0	8 5 0
Angles, Foreign, c.i.f. Thames	do.	7 5 0	7 7 6
Tees do. do. do.	do.	7 7 6	7 10 0
Joists, do. do. do.	do.	6 10 0	6 12 6
Channels do. do. do.	do.	6 12 6	6 15 0
Tin, Foreign	do.	193 0 0	194 0 0
Do. English ingots ...	do.	198 0 0	199 0 0
Zinc, sheets, Silesian, f.o.b.	do.	31 10 0	32 0 0
Do. do. V.M. do.	do.	31 0 0	32 0 0

TIMBER.

Deals, Archangel, Yellow, 3rd, 3×9	per std.	11 0 0	—
Do. Aryd, Yellow, 1st & 3nd, 3×4	do.	9 0 0	—
Do. Fingermanholmen, Yellow, unsorted, 2½×7	do.	7 0 0	—
Do. Grimstad, Yellow, 1st & 2nd, 2×4	do.	8 5 0	—
Do. Hommelvik, Yellow, unsorted, 3×9	do.	9 5 0	—
Do. Hernösand, Yellow, 4th, 3×9	do.	9 15 0	—
Do. Kovda, Yellow, 3rd, 3×9	do.	11 0 0	—
Do. Lovisa, Yellow, 1st & 2nd, 3×9	do.	9 10 0	—
Do. Mobile, Rio Prime Pitch Pine, 3×9	do.	12 0 0	—
Do. Mesane, Yellow, 3rd, 3×9	do.	10 10 0	—
Do. Montreal, Red Pine, 1st, 3×9	do.	12 0 0	—
Do. do. do. 2nd, 3×9	do.	10 10 0	—
Do. Quebec, Spruce, 2nd, 3×9	do.	9 15 0	—
Do. St. John, Spruce, unsorted, 3×8	do.	8 0 0	—
Do. do. do. do. 3×7	do.	7 15 0	—
Do. do. do. do. 3×6	do.	7 10 0	—
Do. Skelleftea, Yellow, 1st, 4×9	do.	12 0 0	—
Do. do. do. do. 4×6	do.	10 0 0	—
Do. do. do. do. 3×9	do.	11 0 0	11 5 0
Do. do. do. do. 3×8	do.	10 5 0	—
Do. do. do. do. 3×7	do.	10 0 0	10 5 0
Do. do. do. do. 3×3	do.	8 15 0	—
Do. do. do. do. 2½×7	do.	10 0 0	10 15 0
Do. do. do., 2nd, 3×9	do.	9 15 0	—
Do. do. do. do. 3×8	do.	9 10 0	—
Do. do. do. do. 3×7	do.	9 5 0	—
Do. do. do. do. 3×3	do.	8 0 0	—
Do. do. do. do. 2½×7	do.	9 15 0	—
Do. do. do. 4th, 3×9	do.	10 10 0	—
Do. Soroka, Yellow, 1st, 3×9	do.	19 5 0	—
Do. Storfors, Yellow, 2nd, 2½×7	do.	9 10 0	—
Do. Umba, Yellow, 3rd, 3×9	do.	11 0 0	—
Do. Wyburg, Yellow, unsorted, 3×4½	do.	8 5 0	—
Battens, Archangel, Yellow, 3rd, 2×9	do.	9 15 0	10 0 0
Do. Holmsund, Yellow, unsorted, 2½×3	do.	8 0 0	—
Do. Kristinestad, Yellow, 1st & 2nd, 2×7	do.	9 0 0	—
Do. Skelleftea, Yellow, 1st, 2×7	do.	10 5 0	—
Do. do. do. do. 2×6	do.	9 15 0	—
Do. do. do. 2nd, 2×7	do.	9 10 0	—
Do. do. do. do. 2×6	do.	9 5 0	—
Do. Umba, Yellow, 4th, 2×9	do.	10 0 0	—
Flooring Boards, Fredriksstad, Yellow, unsorted, 1×7	do.	0 10 9	—
Do. do. do. do. 1×6	do.	0 10 0	—
Do. do. do. do. 1×5	do.	0 9 0	—
Do. Gefle, Yellow, 2nd, 1×5	do.	0 9 9	—

Manchester New Infirmary.—At a meeting of the Management Committee of the Manchester Infirmary last week it was stated that the new infirmary buildings were expected to be completed by the end of July, 1908. (When dealing with the new infirmary in our "Contractors' Supplement" last week we omitted to mention that the joint architects for the building are Mr. Edwin T. Hall, F.R.I.B.A., of London, and Mr. John Brooke, A.R.I.B.A., of Manchester.)

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Caergwrle (Wales).—For the erection of new chapel. Mr. M. J. Gummow, A.R.I.B.A., architect, Egerton Street, Wrexham:—

Probert, Hope	£1,385 0 0
Lewis Brothers, Wrexham	1,375 0 0
R. Roberts, Pen-y-gelli	1,300 0 0
Moss, Coedpoeth	1,280 0 0
Peters, Buckley	1,260 0 0
Simmons, Gwersyllt	1,219 0 0
J. Williams, Brymbo	1,200 0 0
T. Williams, Southsea	1,080 0 0
T. Jones,* Wrexham	1,077 10 0

* Accepted.

Cardiff.—For the enlargement of head post-office, Cardiff, for H.M. Office of Works, &c.:—

		Cr.
Stephens, Bastow & Co. ...	£13,550	... £120
D. Davies & Sons	13,370	... 220
W. Williams	13,092	... 51
E. Turner & Sons	12,316	... 271
J. Allan & Sons	12,302	... 200
W. E. Blake	11,280	... 160
W. King & Son*	11,090	... 140

* Accepted.

Hanley Swan.—For the construction of Hanley Swan sewerage works. Messrs. Willcox & Raikes, enginers, 63, Temple Row, Birmingham:—

Contract No. 1.

W. Hayes & Son, Malvern ...	£4,398 0 0
R. W. Blackwell & Co., London	4,195 15 11
R. H. B. Neal, Plymouth	4,191 0 0
B. Firth & Co., York	4,170 3 3
Lock, Andrews & Price, Nottingham	4,014 7 9
R. C. Brebner, Edinburgh... ...	3,998 3 0
J. H. Macdonald, Oxford	3,975 7 8
Meredith Brothers, Gloucester	3,950 0 0
F. W. McCann, Malvern Link...	3,887 0 0
J. A. Meredith, Cradley	3,842 0 0
H. Holloway, Wolverhampton...	3,799 0 0
H. Law, Kidderminster	3,753 0 0
W. Westwood, Bromyard	3,717 19 3
G. Law, Kidderminster	3,717 0 0
F. Osenton, Staines	3,695 0 0
J. Byard & Son, Gloucester ...	3,666 0 0
T. Vale & Sons, Stourport	3,625 0 0
J. Riley, Cheltenham	3,604 10 9
J. & A. Brazier, Bromsgrove ...	3,250 0 0

Harrogate.—For the construction of light railway, for the Harrogate Gas Co. Mr. Edward Wilson Dixon, M.I.C.E., engineer, 3, East Parade, Leeds:—

W. M. Treglown & Co., Cardiff ...	£28,952
Whitaker Brothers, Horsforth	26,310
O. Atkinson & Sons, Harrogate ...	22,290
Tait & Gordon, Manchester	21,584
Morrison & Mason, Glasgow	21,431
A. Stark & Sons, Glasgow	20,365
H. Lovatt, Ltd., Doncaster	19,798
Hardy & Atkinson, West Hartlepool	18,992
J. T. Short, West Hartlepool	17,683
J. D. Nowell & Sons, London	17,245
W. Hill & Co., London	16,632
R. C. Brebner & Co., Edinburgh ...	16,286
J. Schofield & Co., Leeds	16,103
W. Monsley, Exmouth	15,994
E. Nuttall & Co., Manchester	15,864
R. M. Parkinson, Peterborough ...	15,615
B. Firth, Harrogate	15,505
J. Dickson, St. Albans	15,475
B. Lumb, Todmorden	15,465
W. Pattison & Sons, Sleaford	15,181
H. Matthews, Harrogate	14,838
A. R. Hobbs, Stockton-on-Tees ...	14,549
J. Bentley, Bradford	14,535
Parker & Sharpe, York	14,513
G. Mackay & Son, Edinburgh	14,318
Smith Brothers, Burnley	14,182
T. Young & Son, Wakefield	13,620
A. Graham & Sons, Huddersfield ...	13,462
A. Braithwaite & Co., Leeds	13,362
Holme & King,* Liverpool	13,218
J. Moffatt & Co., Manchester	12,902

* Accepted.

Engineer's estimate, £14,500.

Humberstone.—Accepted for the erection of Wesleyan chapel and school at Humberstone. Messrs. Gelder & Kitchen, architects, 120, Alfred Gelder Street, Hull:—

J. Kime, Candlesby, Burgh	£1,076

London, N.—For the erection of 103 cottages on the second part of Section B of the White Hart Lane Estate, Tottenham, for the London County Council:—

T. J. Hawkins & Co., London ...	£36,749
J. Stewart, Tottenham	29,392
Charles Wall, Ltd., London	29,058
F. J. Coxhead, Leytonstone	27,542
Rowley Brothers,, Tottenham	24,552
G. H. Carter, Tottenham	24,136
G. D. Barns, Tottenham	23,985
G. E. Pulford,* Wood Green	22,200

* Recommended for aceptance.

Reading.—For the erection of Lady Wantage Hostel, University College, Reading. Messrs. C. Smith & Son, architects, Friar Street, Reading:—

Margetts & Son	£27,990
Collier & Catley	26,479
Kingerlee, Oxford	25,587
McC. Fitt	25,378
Hughes, Wokingham	24,550
Lewis Brothers*	24,550

* Accepted.

Rest of Reading.

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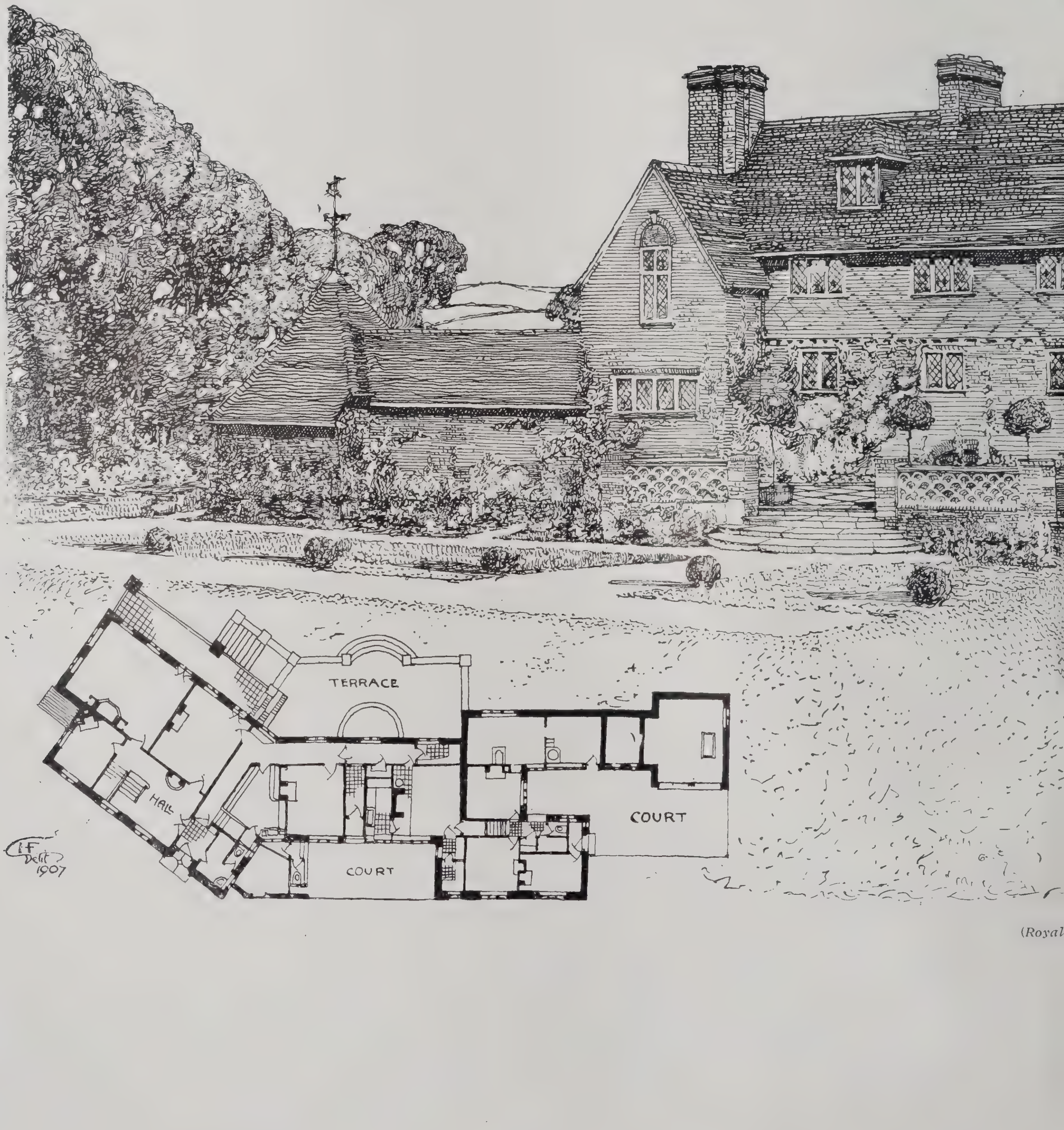
Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, May 15th, 1907.

HOUSE AT THURSLEY

NIVEN·WIGGLESWORTH·&·FALKNER·ARCHITECTS



(Royal

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May 15, 1907. Volume 21, No. 640

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The Holborn-Strand Improvement.

THE want of success which the London County Council has experienced in connection with the letting of the sites on the area of the Holborn-Strand improvement has been the subject of general comment. The building conditions particularly have been criticised adversely. The Improvements Committee have at last carefully considered the subject, and at yesterday's meeting reported on several revised proposals, which will, in their opinion, greatly accelerate the letting of the land. The various sites fronting the Strand have been available for letting for nearly five years, while portions of the land on the north-east side of Aldwych have been available for nearly four years, and the whole of the remaining surplus land for about a year and a half. Various sites have been put up to auction from time to time; hoardings have been erected inviting offers for the land; and advertisements have been inserted in the papers. As a result, although most of the land in the side streets has been disposed of, only six sites on Kingsway have been let, while none of those in Aldwych or the Strand (excepting the sites for the reinstatement of the Gaiety Theatre and Restaurant and Messrs. Short's premises) have been taken up. Of the main road frontages, therefore, about 70 per cent. of the whole has still to be disposed of. The annual interest amounts to a large sum, and the sinking fund will come into operation next year. The Improvements Committee are of opinion that the high prices charged for the land are reasonable, and that the building conditions, the severity of which has been objected to, are no more onerous than those customary on other large estates in London; they have, however, modified, shortened and simplified the conditions as far as possible. Although they have retained the provision that preliminary disputes shall be decided by the Council's architect, disputes continuing thereafter are to be subject to arbitration, with provisions that should be satisfactory to lessees. It will be recollected that one of the clauses most criticised was that the elevations of buildings on land fronting the Strand, Aldwych and Kingsway should be of marble, granite, Portland or other approved stone or brick, and should be of such design as the Council approved as worthy of the position. From an architectural point of view we were glad to see such a provision in the conditions, and the results have certainly been satisfactory so far, although perhaps a more rigid censorship on design would have been still better. Perhaps, however, a milder clause would have been sufficient and more business-like, because the importance of the position is such as to call forth the best efforts of architects engaged. The Committee, in deleting the objectionable clause, do not throw away all control, for the conditions as amended provide that a lessee shall erect a building of an elevation and of materials to be approved by the Council. It is further held that even this amendment of the conditions is insufficient, and two further proposals are made. As an incentive, until a certain number of sites have been let and the commercial character of the thoroughfare has thereby been established, lessees will only be asked to pay a peppercorn rent for the first year, 25 per cent. of the ultimate rent for the second year, 50 per cent. for the third year, and 75 per cent. for the fourth year. The second proposal is that auctioneers and estate agents generally should be interested in the disposal of the land. The principle of the payment of commission has already been adopted, but the scale is far below the one customary in the profession, and is an insufficient inducement to agents of standing. It is intended that the Council's own valuer shall act as before, but that instead of, as at present, offering the land to the whole of the profession, the Council will appoint one firm to act as their agent, who will deal with the valuer. An increased scale of commission will now be offered.

New, True, or Neither

Some hundreds of poles are being employed in connection with the decoration of the British Museum reading-room. Considering what a fuss has been made about the gold-leaf which is to be used, it is surprising that the Tariff Reform Commission has not raised a point about this wholesale use of aliens in a building that is British to the damp-course.

* * *

There were some definitions in the "instructions" to guests at the recent A.A. members' dinner which are deserving of a wider record than the archives of the Gaiety Restaurant, so they are gathered into this column. The expression "A.A. dinner" was defined as a dangerous structure sometimes undermined by speeches and requiring to be underpinned by the entertainment; whilst the expression "speeches" meant one or more vertical partitions interposed between a dinner and an entertainment, or somewhat long-winded passages leading up to several indistinct or separate tall storeys.

* * *

The "instructions" being in the form of a party structure notice, the proposed work included the following:—

To pull down and rebuild the conditions for the L.C.C. County Hall competition, if so far defective or out of repair as to make such operation necessary or desirable.

To pshaw up Riley with a Third Surveyor.

To cut away the footings (if any) or chimney breasts, jambs and flues of St. Paul's which may happen to project into the new sewer.

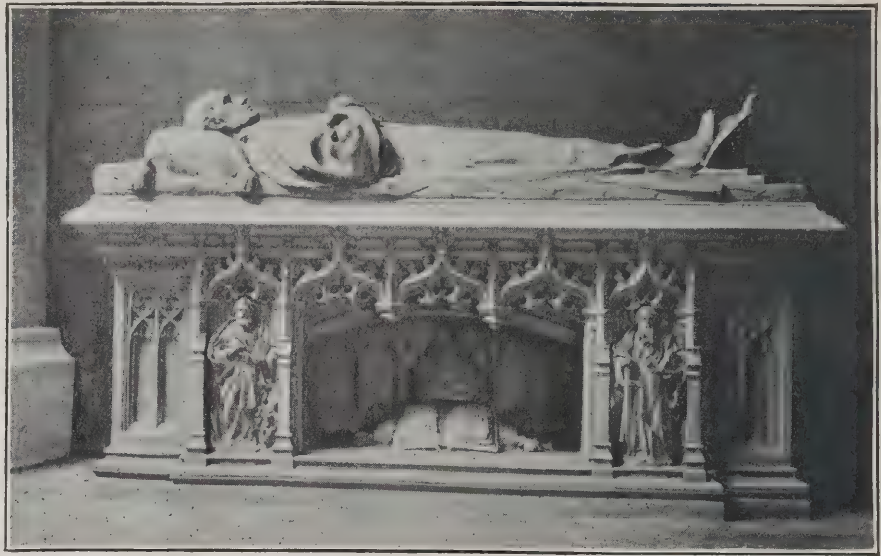
To pull down the arches forming the lower storey of the new and proposed buildings adjoining the public way or street known as The Quadrant, Regent Street, W., which are apparently of sufficient strength, and to rebuild the said lower storey of insufficient strength, in conformity with the fancied needs of the possible occupiers.

THE LOOKER-ON.

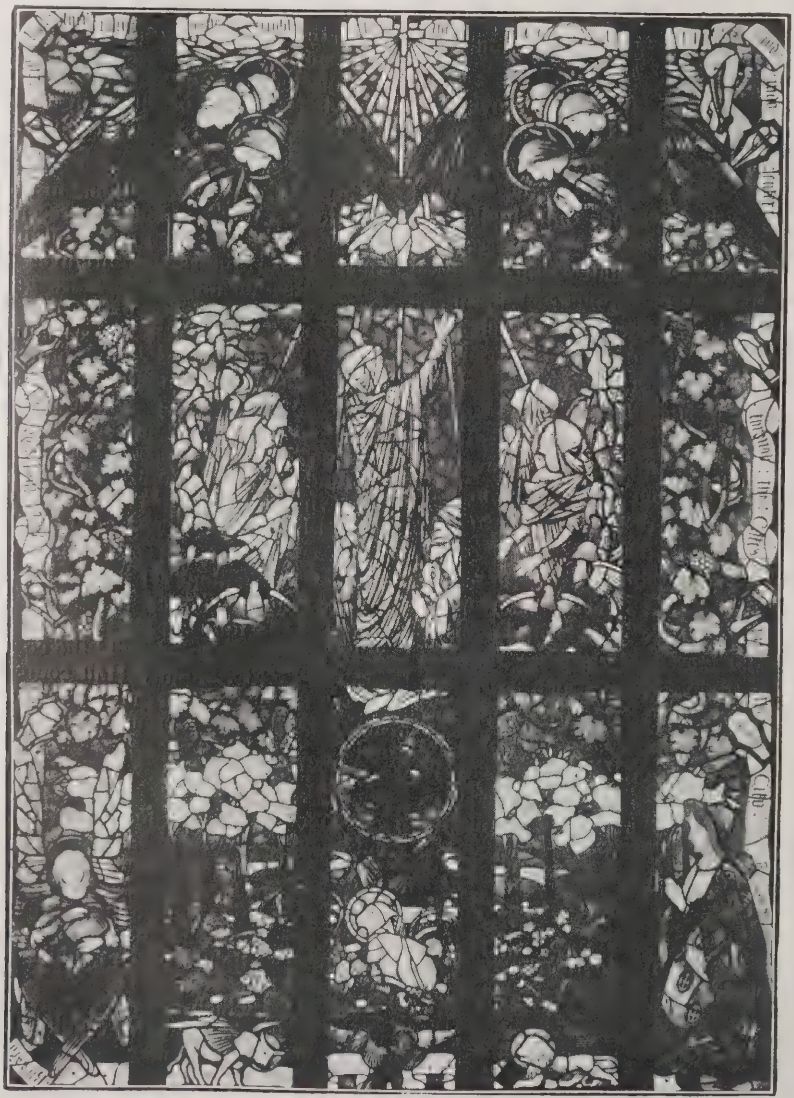
STAINED GLASS.

On this page we reproduce a photograph of a window executed by Baron Arild Rosenkrantz, of 18, Clareville Grove, S.W. This window is in the private chapel of Hewell Grange, the seat of Lord Plymouth. Unfortunately we cannot give the colour, and in that respect the illustration is necessarily very deficient; it suffices, however, to show the general scheme. The window is quite modern in feeling, while conforming to good traditions, and based on the principles of the best work of the past.

Baron Rosenkrantz is one of the foremost craftsmen in stained glass. He has carried out much admirable work, among which we may mention windows at the Christian Science Church in London; Welbeck Abbey (for the Duke of Portland); Southwick Church, Dumfries; and other windows for the Earl of Berkeley, and Messrs. Tiffany, the well-known firm of art craftsmen in New York. Baron Rosenkrantz has used Tiffany glass, which, as is well-known, secures depth of colour by increased thickness, thereby to some extent obviating the necessity for plating and for painting, but he is not particularly enamoured of this modern invention, and does not find that it generally offers any special advantages over the old system. Baron Rosenkrantz is a draughtsman of ability. We mention this because it is an unfortunate fact that a great many of the stained-glass artists of to-day seem to have taken up this branch of work after having been failures as painters. It is bad enough for those deficient as draughtsmen to take up the humbler crafts, but with such a difficult art as stained glass the matter is ten times worse.



MONUMENT TO THE LATE BISHOP ELLICOTT, TO BE ERECTED IN GLOUCESTER CATHEDRAL. WILLIAM S. FRITH, SCULPTOR. (*Royal Academy Exhibition*, 1907.)



WINDOW IN PRIVATE CHAPEL AT HEWELL GRANGE, THE SEAT OF LORD PLYMOUTH. EXECUTED BY BARON ARILD ROSENKRANTZ.

DILAPIDATIONS.*

How to Prepare Schedules.

By H. T. A. Chidgey.

The dilapidations with which surveyors most usually have to deal are confined to house property, and it is to this branch of the question that I propose to confine my present remarks.

Dilapidations usually arise owing to breach of the repairing covenants contained in the lease or other instrument under which the property is held. These covenants are by no means universal in their form, and generally vary with every individual document, though they are usually identical in each instance in the case of large estates.

It would be a great convenience, and would save much dispute, if some standard clauses could be formulated and be of universal application; indeed, attempts have been made in this direction, notably in the case of an Act of Parliament, 8 and 9 Vic., c. 124, in which it was laid down that if the lease were expressly stated to be made under that Act certain expressions were to mean more than actually expressed. Thus, "and to repair" means and must be construed—

> And also will during the said term well and sufficiently repair, maintain, pave, empty, cleanse, amend and keep the said demised premises with the appurtenances in good and substantial repair, together with all chimney-pieces, windows, doors, fastenings, water-closets, cisterns, partitions, fixed presses, shelves, pipes, pumps, poles, rails, locks and keys, and all other fixtures and things which at any time during the said term shall be erected and made when, where and so often as need shall be.

Again, "and to paint outside every . . . year" means and must be construed—

> And also that the said lessee, his executors, administrators and assigns will in every . . . year in the said term paint all the outside woodwork and ironwork belonging to the said premises with two coats of proper oil colours in a workmanlike manner.

And again, "and to paint and paper inside every . . . year" means and must be construed—

> And also that the said lessee, his executors, administrators and assigns will in every . . . year paint the inside wood, iron and other works now or usually painted with two coats of proper oil colours in a workmanlike manner, and also repaper with paper of a quality as at present such parts of the premises as are now papered, and also wash, stop, whiten or colour such parts of the said premises as are now plastered.

Whatever we may think of the details of the clauses, they are admirable examples of abbreviation. Would that in taking-off quantities we could save time and writing so effectually. I am not aware, however, that this Act is very largely taken advantage of—at all events, I have not yet met with a case.

---

* Abstract of a paper read before the Quantity Surveyors' Association on April 26th, 1907.

It would be a distinct advantage in the matter of precision of meaning and greater technical accuracy if lawyers, in drawing up leases, would obtain their repairing clauses from some competent surveyor, instead of (as too often appears to be the case) copying in these clauses from some old lease taken as a model, in which vague expressions and indefinite and general terms are used, in many respects quite out-of-date.

As regards the proper person to be employed in preparing schedules of dilapidations, I have no hesitation in stating that in my opinion the best possible individual to discharge this duty is a quantity surveyor, though I regret to find it is far too often the practice for an auctioneer or a house agent to be employed for the work.

Let us assume that the client has handed over his interests to the care of a duly-qualified quantity surveyor, and proceed to consider briefly how the work should be done.

Instructions having been received to prepare a schedule, the first thing is to obtain the lease or counterpart and make a careful study of the repairing clauses, both specific and general. I have always ound it advantageous to copy out these lauses on a separate sheet of paper, giving the folios and particular lines in he document from which the extract is made. This not only saves the trouble f hunting up the clauses each time they re referred to, but enables one to return he document at once to the solicitor or ther person having charge of it. It is good thing, too, if a plan and dimenions are found in the lease to keep a small racing.

The repairing clauses should be carefully tudied, with the object of employing in he schedule as far as possible the actual erms used in the covenants of the lease r other document under which the claim made. Unless this course is adopted ne is liable to use terms which a shrewd pponent could reasonably call in queson as being not included in the covenants f the lease. For instance, when "renew" employed by the surveyor, and "re-air" is used in the covenants, it is often ontended that an unreasonable requireent is being made.

In making the schedule it is advisable attach your valuation of the work reuired to be done to each item as you oceed. Even if the valuation in the end ould not be required, the advantage of timating on the spot is worth the ouble.

I have found it a good plan to have a gular order in which to make the tes, beginning, say, with ceiling, centre wer and cornice, then walls and skirt-g, then floor, fireplace, chimney-piece d hearth, then doors and windows, after ich any sundries peculiar to the room u happen to be in. Each room must, course, be separately noted and heduled. The staircase and passages d the plumbing and sanitary work ually complete the interior. Then the tside claims attention. Begin with the of and all its accessories—roof cover-g, flashings, filletings, chimney stacks, s, parapets, gutters, down-pipes, &c — n go on to the front and back, and note as to areas, pavings, fences, fence walls and drains. Finally, a good comprehensive general clause to cover anything which may have escaped attention, or may be disclosed in the course of executing the other scheduled repairs.

Having prepared the schedule and delivered it to the solicitor for service, or having served it yourself, as the case may be, giving the usual three months' notice in which to carry out the work, nothing now remains but to await the result. In some instances this will mean the appointment of a surveyor on the other side, by whom your work will be criticised and minimised as far as he is able to do so! You will be called upon to meet him and justify your demands, which you will easily be able to do if you have adhered carefully to the terms of the lease. If it should be the end of the term, and a monetary payment has been demanded, a tug-of-war over prices will doubtless ensue. If, however, your prices were attached as you went along taking the particulars, and, of course, if they are reasonable in their nature, you will again have no difficulty in defending your opinions, and either convincing your opponent or the umpire, if one should be appointed.

In other cases tenants will simply ignore the schedule and at the expiration of the notice you will find on going over the premises that nothing has been done. This is a case which will probably result in litigation, and here again the value of the foregoing hints will be apparent. The painstaking surveyor who is sure of his facts makes the best witness and gives himself the best chance of coming safely through the ordeal of cross-examination.

There is another side of the subject of dilapidations which does not meet with the attention it deserves, and which often leads to considerable loss and detriment to the parties concerned. It occurs in connection with leasehold property. Buyers, often with the most cursory examination of the covenants of the lease they are about to purchase, take upon themselves obligations of an extremely onerous character, and find when too late the mistake they have made in assuming responsibilities which ought to have been discharged by their predecessors. Before completing the purchase they should have instructed a surveyor to prepare a schedule of dilapidations on their behalf, based upon the covenants of the lease, with a proper valuation of the cost of the necessary repairs. In many instances this would materially affect the price they are about to give, and in any event they would be bargaining with their eyes open. I commend this to your careful notice as a course to be recommended as occasion should offer.

In conclusion I would make the following remarks to those about to prepare a schedule of dilapidations between landlord and tenant :—

Remember in all your claims that you cannot ask for the premises to be made superior to the original construction.

You must make allowance for fair wear and tear.

Remember that fixtures left on the premises at the end of a term, and a new lease granted, become part of the freehold, unless specially reserved to the lessee in the new lease.

Remember if you are called upon to act as an umpire you need not, and should not, give reasons for any decision you may make.

It has been decided that damages in an action for non-repair are not the amount which it will cost to put the premises into repair, but the amount by which the marketable value of the reversion is depreciated.

Remember that an under-lessee cannot be sued by the freeholder for breach of covenant. He is liable to his superior landlord, who in turn is liable to the freeholder.

Discussion.

In the discussion following the reading of the foregoing paper, Mr. W. R. Hood, F.S.I., observed that the expression "fair wear and tear" had a very elastic meaning, and had been argued in various ways, all more or less unsatisfactory. As regards the definition of repairs in the schedule being sometimes drawn up by a solicitor, he cited a case where the terms of a schedule drawn up very tersely by a solicitor were subject to a very wide definition; for instance, it was said in it that the joinery work was to be left as new. The case was brought before the Court, and the judge observed that, from the evidence of the surveyors, it had evidently been left as new, inasmuch as the work was very bad when the place was originally built, and that it was left very bad; he gave judgment for the defendant. Mr. Hood quite agreed that a quantity surveyor was particularly qualified to be a dilapidation surveyor. As a side issue, he referred to the work they had missed in not being appointed assessors of damages incurred by fires, and he expressed the hope that the Quantity Surveyors' Association would pursue that subject as far as possible, for undoubtedly a quantity surveyor could assess fire damages far better than an auctioneer—and the majority of fire assessors he (Mr. Hood) came in contact with in assessing fire damages were auctioneers. Another question was the payment of dilapidation surveyors' fees. It was a most iniquitous system that they had to some extent drifted into of a dilapidation surveyor being paid his fees on the completion of, or perhaps rather before the completion of, the work; and they were not even demandable before the case went into court. If the case were one that had to be taken into court, then the judgment given against the lessee carried with it the payment of the surveyor's fees. "I have advised my clients nearly every time I had an opportunity of doing so not to pay the dilapidation surveyor's fees; otherwise, we do not get the free and conscientious carrying out of the covenants of the lease."

Mr. R. J. Tollit also raised the question as to the "fair wear and tear" clause. He also asked, in regard to the ordinary letting of a house, the construction of which the landlord agreed to keep in good repair, and the inside of which the tenant agreed to keep, whether there was any rule or law which defined which was the constructional part of the house and which was the other. Of course, the outline of the construction was obvious to anybody, but when it came to a thing like drainage—such as the ordinary house connection with the sewer, if that drain stopped, for instance, in the sink gulley—was that a structural repair for the landlord, or a tenant's repair? Was it inside the house, being part of the sink, or in the construction of the house as being part of the drain?

Mr. C. W. Ball agreed with Mr. Tollit in regard to the matter of drainage. It was always a very difficult question when one had to survey for dilapidations. One did not like to adopt the stringent course of having the drains uncovered—indeed, that might seem to be quite unnecessary; still, if the house were an old one, and there had been no new drains for many years, it would probably be found that they were badly laid, because at the time they were laid there was not very much supervision; they were not laid on concrete beds, and the joints were probably made in clay; and there was always the chance that the drainage would fail at any moment almost, for, in his opinion, no system of testing was altogether satisfactory. He would also be glad to hear from Mr. Chidgey whether "good repair," "habitable repair," and "tenantable repair" were synonymous terms, and whether the term "tenantable repair" would cover papering and distempering. Recently, in making a survey for dilapidations he had found the basement floor entirely rotten, having been affected by dry rot caused by the want of air under the floor, there being no air bricks. In that case, would it be considered in accordance with the terms of the lease of the tenant, when giving up the premises, were to take up the wooden floor and put down a concrete floor in its place. If a wooden floor were put down, of course, in a short time that would rot away too. Another question was whether a surveyor in valuing for dilapidations was supposed to have an appraiser's license.

Mr. A. J. Gate, F.S.I. (chairman of the meeting and president of the Association) said the point had been raised as to "good repair," "habitable repair" and "tenantable repair," and as to whether at the end of a lease there must be paper and paint, &c., in the house of the value of that existing at the beginning. He suggested it would be better if Mr. Chidgey gave advice not exactly in accordance with that statement (for no one could tell at the end of a 21 years' lease), but would say that the law required that such paper or paint should be put on the walls as would place the premises in such condition as they might reasonably be expected to be in by an incoming tenant at the ordinary rental of such property in the neighbourhood.

Mr. Chidgey, replying, said that it was always a bone of contention as to what constituted "fair wear and tear," no one being able to decide exactly what it was. The best answer he could give was that the question should be approached in a reasonable fair-minded spirit, with no expectation of a new house at the end of a long lease. A certain amount of wear and tear to premises could not be avoided, and if it was the consequence of ordinary usage of the premises he did not think tenants could be asked to replace work used in that way. The question of the payment of surveyors' fees had been another bone of contention. A tenant was not liable for the payment of such fees unless and until the matter came into court; then the surveyor's fees were regarded as fees for going to view, in which case they could be charged as against the defendant if the case went against him. As to what a tenant and landlord would be liable for under an agreement where the landlord was supposed to do structural repairs and the tenant inside repairs, the one was responsible for repairs to the fabric, and the other for the decorations—*i.e.*, for papering, painting, white-washing, &c. The question of drains was somewhat more difficult. It all depended upon where plumbing ended and drainage began. The waste from the sink, he should say, was plumbing rather than drainage; therefore, if the waste from the sink were stopped it would necessarily be by an act of default on the part of the tenant, and should be cleared by him. It was fair to assume in the case of an ordinary long agreement that the landlord's responsibility was retained for the whole of the outside drainage until it reached the house. In regard to the inspection of drains at the end of a long lease (for instance, 99 years) one could not expect a modern, up-to-date house complete in all respects at the end of 99 years. A house could only be placed in such repair as corresponded with its original condition. He did not think anyone could legally require a tenant to take up drains and relay them in the modern scientific manner. So long as the drains were doing their work as drains, he did not think the tenant should be called upon to relay them unless they had been so obviously neglected that there was nothing else to be done. With regard to the point raised as to whether the terms "good repair," "habitable repair" and "tenantable repair" all had the same meaning, "habitable repair" and "tenantable repair" were almost the same—at any rate, he could not see much distinction between them—but "good repair" depended entirely upon the opinion of the person asking for good repair, for what one man considered good repair another might not. He thought Mr. Gate's remark was a very good guide in regard to this—that the paint and paper and general repairs should be suitable to a house let at the rent generally obtained in the neighbourhood. In all these matters it was necessary to have due regard to the position of the house and to the class of tenant likely to occupy it. As to whether "tenantable repair" covered papering and distempering, he certainly thought it did, for a place would not be in tenantable repair unless papered or distempered. Dry rot in a basement floor was a much-disputed question. He thought this came under the general covenants in the lease. If a floor were allowed to get dry rot it was not being kept in the condition in which it should be kept. As to whether a wood floor might be replaced by a concrete floor, that would be purely a matter of agreement between the parties. Finally, as to whether an appraiser's license was necessary, it had been held not to be necessary in the case of preparing schedules of dilapidations, except as a means of recovering fees from a client. The possession or non-possession of an appraiser's license did not affect the validity of the schedule of dilapidations as such, but without it one could not recover fees legally if they were disputed.

Our Plate

House at Thursley, Surrey.

This house is now being built in a beautiful position on the hills near Thursley. It is faced with dull red bricks, and all external woodwork is oak. The contractor is Mr. E. C. Hughes, of Wokingham, and the architects are Messrs. Niven, Wigglesworth and Falkner, of 104, High Holborn, W.C., and Farnham.

LONDON COUNTY HALL COMPETITION.

During the past week there has been published a letter commenting upon the conditions of the above competition, signed by the following architects:—

J. S. Gibson, Alfred W. S. Cross, C. E. Mallows, H. V. Lanchester,	Members of Council, R.I.B.A.
J. Donald Mills (Dundee), Harbottle Reed (Exeter), James M. Monro (Glasgow), J. H. Woodhouse (Manchester), J. T. Cackett (Newcastle), W. Dymock Pratt (Nottingham), Arthur Pollard (York),	Presidents of Allied Societies.
E. A. Rickards, G. Hubbard, W. G. Wilson, A. W. Moore, R. S. Ayling, Winton Newman, H. W. Wills, J. Anderson, A. E. Munby,	Metropolitan Members, R.I.B.A.

After reciting the particulars of the inception of the competition, the division of it into two stages, &c.—particulars which are already familiar to our readers—the letter goes on as follows:—

"The principle of a jury of assessors is a sound and commendable one, and we are glad that the Council has adopted it. It, however, appears to us that if the services of three assessors are necessary in order to make a wise final choice from a limited number of designs, the need for their combined judgment becomes increasingly imperative in the first stage of the competition. We consider this a matter of the utmost importance, as the success of the competition entirely depends on the greatest care being bestowed on the selection of designs in the initial stage.

"The Council also intends to associate its Superintending Architect with the successful competitor in superintending the erection of the selected design, and will invest him with discretionary powers to control the successful architect in all really important and vital matters, and thus place him in a position of authority over the actual architect.

"This arrangement tends to destroy the real architect's enthusiasm and initiative, damages his self-respect, and reduces him to the level of a sub-official of the Council under the control of the Superintending Architect. In effect, it merely adds another sub-department—the County Hall Department—to the large number of those already administered by the Superintending Architect, with the successful architect as chief assistant.

"We may be permitted to doubt if any large number of prominent architects—leaders of the profession—will be eager to compete for such a position, or whether it would be possible for any one of them to produce his best work under such conditions.

"If, however, the Council intends that its Superintending Architect shall not exercise such powers, but shall be joint-architect with equal authority, a system of dual control would be adopted which would be injurious to the building and subversive of the public interest.

"Apart from these considerations, it is contrary to the rules of the Royal Institute of British Architects governing professional conduct that any one man should occupy the two positions of joint-assessor and joint-architect in any competition, however limited his powers may be, and we are at a loss to understand how the Superintending Architect (as a member of the Institute) could have allowed himself to be placed in this delicate and invidious position, or permitted his Council to suppose that any members of the Institute could be expected to compete.

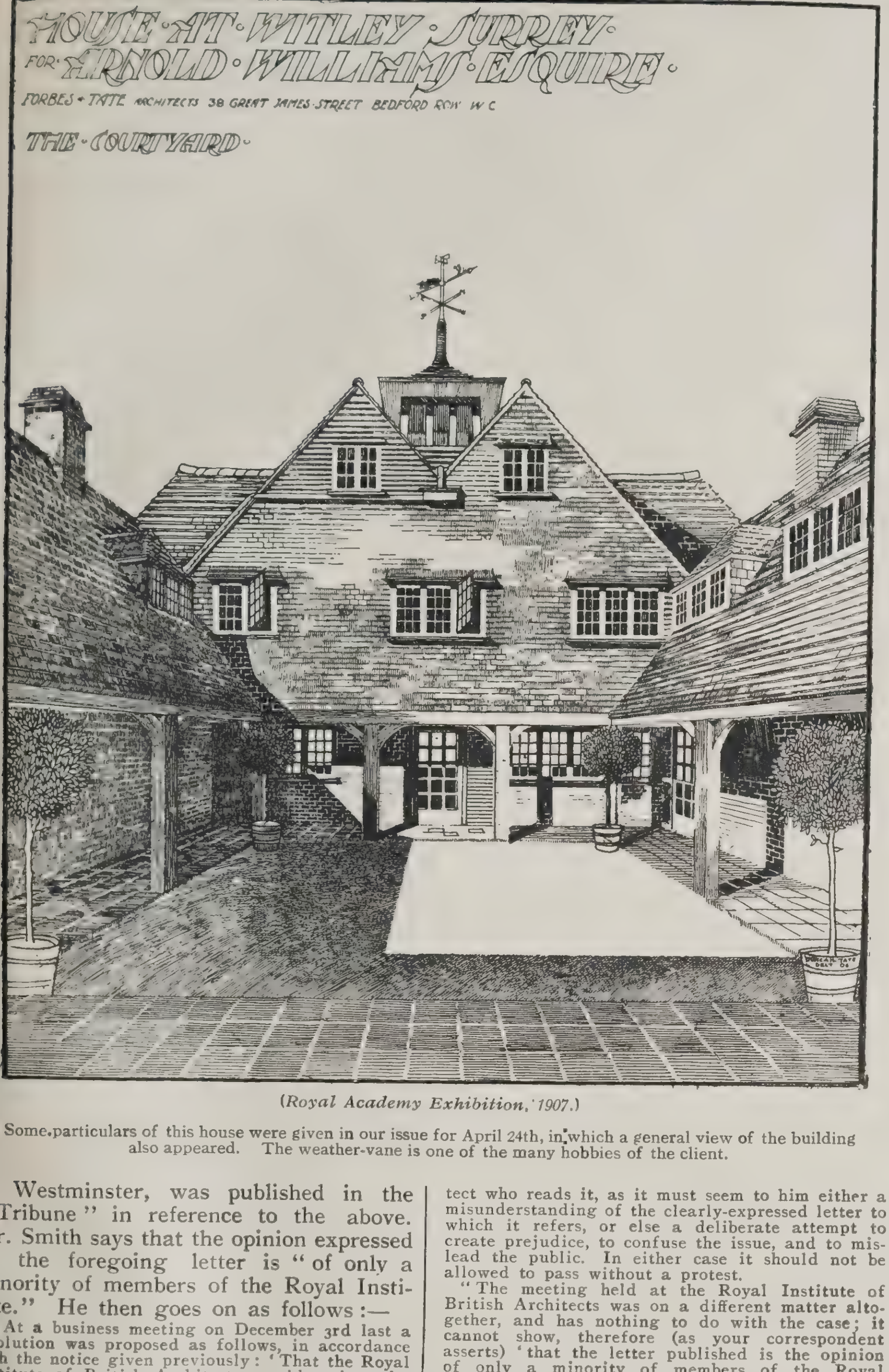
"To ensure the receipt of designs from prominent men, the Council specially invited eight architects to compete, seven of whom are members of the Institute. These gentlemen were selected before the Council issued its conditions, and presumably did not foresee their present dilemma.

"Did space permit we might enlarge on the irrelevance of the arguments used by the chairman of the Establishment Committee in support of the dual-control system. The instances he cited of two well-known buildings are really illustrative of its disastrous effects.

"We may, however, state briefly that these conditions are such as must be resented by professional men, and as in consequence the best architects are not likely to compete while they remain unrevised, success of this vast enterprise is far from certain.

"We consider that on public grounds the Council must revise the conditions so far as they affect the judging of the designs and the control of the erection of the building. We would, therefore, suggest that another independent architect familiar with schemes of this unusual magnitude be immediately appointed as a third assessor, so that absolutely the best possible designs may be selected in the first stage of the competition, and that after the final choice of a design is made the Council should strictly limit its Superintending Architect's duties to that of general professional adviser, in which capacity his rare administrative experience will have ample scope. He will, moreover, be in the most favourable position for safeguarding the interests of the Council and assuring himself that all its requirements have been duly met."

On Wednesday last, May 8th, a letter from Mr. F. J. Osborne Smith, A.R.I.B.A.


HOUSE · AT · WITLEY · SURREY ·
FOR · ARNOLD · WILLIAMS · ESQUIRE ·
FORBES + TATE ARCHITECTS 38 GREAT JAMES · STREET BEDFORD ROW W C
THE · COURTYARD ·

(*Royal Academy Exhibition,* 1907.)

Some particulars of this house were given in our issue for April 24th, in which a general view of the building also appeared. The weather-vane is one of the many hobbies of the client.

Westminster, was published in the Tribune" in reference to the above. r. Smith says that the opinion expressed the foregoing letter is "of only a nority of members of the Royal Insti- e." He then goes on as follows:—

At a business meeting on December 3rd last a olution was proposed as follows, in accordance h the notice given previously: 'That the Royal titute of British Architects considers it unde- ble in the interests of architecture that public ials should act as architects for public build- s.' A long discussion followed, and eventually amendment was proposed that the words 'unless have had an architectural training' should be ed after the word 'buildings,' so that the reso- on would read: 'That the Royal Institute of tish Architects considers it undesirable in the rests of architecture that public officials should as architects for public buildings unless have had an architectural training.' This ndment, after some further discussion, was car- by an overwhelming majority.

As one speaker said: 'Public official architects just as much architects as any other member he Institute.' The mover of the amendment in argument declared that 'it was unthinkable to that the Institute should deliberately say that an should study here, should take the various les of architectural education that they pro- ed; that if he were fortunate enough to win official position by public competition, the est competition they could possibly embark , the moment he was qualified and had ob- ed his position by that competition that he ld not be at liberty thereafter to do anything tever of importance in regard to his work. It reducing the whole thing to an absurdity.'

Inigo Jones and Sir Christopher Wren were ably the greatest architects who ever lived. of these men did the best of their work as ic officials."

eplying to the above, Mr. A. R. Jem- t, F.R.I.B.A., writes:—

The letter from Mr. Frederick J. Osborne h must, I think, be deplored by every architect who reads it, as it must seem to him either a misunderstanding of the clearly-expressed letter to which it refers, or else a deliberate attempt to create prejudice, to confuse the issue, and to mislead the public. In either case it should not be allowed to pass without a protest.

"The meeting held at the Royal Institute of British Architects was on a different matter altogether, and has nothing to do with the case; it cannot show, therefore (as your correspondent asserts) 'that the letter published is the opinion of only a minority of members of the Royal Institute.' If your correspondent, or anyone else, has any bona-fide argument to bring forward showing that it is reasonable and just that any one man should occupy the two positions of joint assessor and joint architect, or that it is in the public interest that an architect should not have the usual full control of his own work, or that the third assessor should not be appointed for the first competition—let him produce them, for they seem to be needed.

"For what reason are Christopher Wren and Inigo Jones dragged into this discussion, unless it be to dazzle readers' eyes with the radiance of these honoured names, and obscure the point at issue, while attention is directed to the perfectly irrelevant fact that these great men were officials? No doubt they were, in a certain sense, officials; not, however, under modern conditions. But, even so, why bring it up against them at this time of day? It is not to be supposed that they were particularly proud of the fact, as no artist would accept such a position if he could get his opportunity without it, and would prefer the work and opportunity without the position. But a man must live, and, at any rate, they justified their position by the splendour of their achievements.

"Although Inigo Jones and Christopher Wren might have accepted the restrictions of official position for the sake of its opportunities, they most certainly would never have accepted the conditions of this competition, which, after all, is the point at issue."

Special Meeting of the R.I.B.A.

A special meeting of the Royal Institute of British Architects is to be held on Tuesday, May 28th, at 8 p.m. to consider the conditions and instructions issued by the L.C.C. in reference to the competition for the new County Hall, and also to consider any action taken by the Institute Council with regard to the matter.

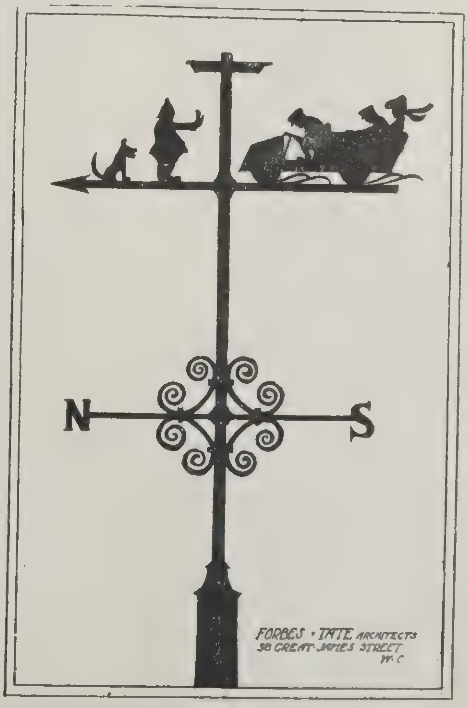
Establishment Committee's Report.

The agenda for yesterday's meeting of the London County Council included a long report from the Establishment Committee in reference to the new County Hall. Among other figures in this report is that of £1,100,000, the estimated cost of the building, foundations and embankment, &c., at the Belvedere Road site; of which amount £600,000 is allotted to the site and £55,000 for the embankment. With regard to the competition, it is stated that the result would be submitted to the Council early in 1908. It is anticipated that the excavation work and retaining wall would be completed by January, 1910, when the superstructure could be commenced and the whole building completed in six years—*i.e.*, by January, 1916, some effort being made to have a portion of the building ready by the summer of 1913.

Six Lectures on "The Architecture of London" (ancient and modern) will be given at the L.C.C. School of Building, Ferndale Road, Brixton, by Prof. Beresford Pite, F.R.I.B.A., on Thursday evenings, at 7.30, as follows:—

May 23.—Westminster and The Abbey.
May 30.—Medieval London—The Temple Church; St. Bartholomew's, Smithfield; Southwark Cathedral; the Tower, &c.
June 6.—The Renaissance Churches of London, by Wren and his successors.
June 13.—Classical London—Somerset House, Waterloo Bridge, the National Gallery, Euston Station, &c.
June 30.—The Gothic Revival—Houses of Parliament, Law Courts, modern churches.
June 27.—Recent Developments—Queen Anne movement, original style and reaction; buildings now in progress.

An Exhibition of French Drawings.—An interesting exhibition of paintings in oil and water colour has been opened at the Grafton Galleries, Grafton Street, Bond Street, W. The works shown are by members of La Société des Aquarellistes Français and La Société des Peintres de Marine. Among the many fine exhibits are a number of drawings of architecture; especially may be mentioned those by Monsieur Réné Binet—in particular a series of six water-colours of Versailles.



THE TIMBER TRADE.

London Market in April.

April was a very quiet month in the wood trade. In every direction, whether at home or abroad, there has been practical stagnation. This has had some adverse effect upon quotations for further importations, and has created some nervousness as to the future course of prices. Messrs. Churchill & Sim report, however, that there should be no need for alarm. A large proportion of the available supplies for the year is already disposed of, and there is good ground for believing that a healthy demand for the summer and autumn is still largely unsatisfied. If the selling of the remaining supplies, Swedish, Russian, Finnish and Norwegian, could be controlled by one strong man the future of markets would be assured. In London, with the exception of some financial trouble, brought to a head by the scarcity of money and credit, there have been welcome signs that the present figures of consumption may be regarded as a mimimum, the dock deliveries in April showing an improvement of 1,700 standards of sawn and planed wood, and of 2,100 loads of timber over those of April, 1906. Any continuance of even this small improvement, in the pronounced absence of any arrangement for further supplies, would have a rapid effect upon prices These, however, hardly moved during April. Deals and flooring boards, as they get scarcer, firm up a little here and there, but for battens there is no change to report from the comparatively low rates current here in March.

Messrs. Denny, Mott & Dickson report that "business during April was of a fairly good all-round character, notwithstanding the continued restriction in building operations. Two or three failures in London attracted more attention than their real importance justified, owing to some nervousness caused by the suspension of timber traders on the West Coast followed by the failure of some of their satellites."

The abstract of dock stock, consumption, &c., for April, published by Messrs. Foy, Morgan & Co., is given in the table at the foot of this page.

Dock Stock.

The stock of wood in the public docks on April 30th was:—

	Pieces.
Foreign deals and ends - - -	1,354,000
Do. battens - - - -	2,400,000
Pine deals and battens - - -	558,000
Spruce do. do - - -	781,000
Boards, rough - - -	3,200,000
Do. prepared - - -	5,183.000

totalling 13,4 76,000 pieces, as against 10,789,000 in 1906, 13,601,000 in 1905, and 15,457,000 in 1904.

In other kinds the stock was as follows:—

Foreign wainscot logs - -	169 pieces.
Do. oak timber - -	1,026 loads.
Do. fir timber - -	1,324 do.
Do. Oregon pine, &c., spars and masts - -	2,653 do.
Colonial oak timber - -	621 do.
Colonial birch timber and planks	5,531 loads.
Do. elm and ash timber -	678 do.
Do. yellow pine - -	626 do.
United States pitch-pine timber	11,954 do.
Do. do. deals -	32,000 pieces
East India teak - - -	5,956 loads.

Deliveries.

The deliveries have been:—

	1st 4 m'ths. Pieces.	April. Pieces.
Foreign deals and ends -	1,200,000	321,000
Do. battens - -	1,801,000	492,000
Pine deals and battens -	259,000	62,000
Spruce do. do. -	443,000	123,000
Boards, rough - -	1,822,000	462,000
Do. prepared - -	4,185,000	1,094,000
Total - -	9,710,000	2,554,000

The deliveries direct from ship to craft were:—

	1st 4 m'ths. P.s.h.	April. P.s.h.
Deals and battens - -	11,492	2,863
Boards - - -	3,154	763
Total -	14,646	3,626

Soft Woods.

Swedish Deals, Battens and Boards.—There is little change to report in the London market. The rate at which the dock stock is moving off was slightly quickened during April, but there is little life in it yet, and prices are unchanged. Buyers continue too nervous and disheartened to enter upon even normal commitments for further supplies, and the early importation will be a small one in consequence. In the absence of forward buying for later shipment, quotations for redwood flooring weakened a little during the month under the insistence of the necessity of providing work during the summer for the Swedish planing mills. Quotations for white battens, &c., also eased off during the month, the financial troubles in Scotland forming one cause for this.

Norwegian Boards.—The early arrivals of flooring boards in April were smaller than usual, and very little provision for importation has been made by London buyers, so that the market here has been quite healthy, and, the consumption keeping fairly steady, prices have shown a fractional tendency towards improvement.

Russian Deals, Battens and Boards.—There is no change to report in the London market during April. Prices for deals keep steady, and, as the best lots pass into consumption, tend slightly to improve. For arrival London buyers are not operating, and what business there is has been mainly confined to filling up orders for country steamers at previous rates. Sales are said to have been made at some reduction from some of the best of the irregular White Sea shipments, sellers having pressed business at an inopportune time, and there is some nervousness as to the unsold stocks for later shipment from St. Petersburg, lest shippers and financial agents should wish to press for contracts prematurely.

Finnish Battens.—There were no fresh supplies during April. The market for battens remained weak throughout the month, the stock in the docks being too heavy for them to be affected by the slight rally which has been apparent in the demand.

Prussian Timber.—-The fresh supplies of fir timber are smaller, or later, than usual, the total replenishment of the dock stock during April amounting to 300 pieces. Retail prices are, if anything, stronger than in March. For oak there has been no change of any sort.

Canadian Timber.—The market for pine deals in London shows no improvement at all, and the somewhat ragged stock, which changed hands during the month, has shown an increasing gulf between the prices realised and those quoted, and presumably obtainable, for regular cuts and specifications. Spruce deals have felt the benefit of an increasing demand from a good general trade, and although there is no lack of supply, and, in spite of the general weakening in quotations for other whitewood, fully held their own during the month. Prices are, nevertheless, still of course at a low level. All the hardwoods except oak have been fractionally better. Especially there has been a welcome improvement in birch. For sawn timber the chief feature has been the pronounced jump in the figures of the London consumption. There were no fresh arrivals during the month, and the market has been continuously depressed by sales from a large cargo of Darien timber, of only moderate quality, at low prices. The stock of good wood is small in London just now, and has been selling freely at rather better prices than in March, but the market offers little prospect of standing up against any quantity of fresh supplies. In pitch-pine deals there has been quite a small rally in London, following on the recent reductions on the cost of fresh importations, the market having been previously a good deal starved during the period of inflation.

Hard Woods.

Teak.—Messrs. Denny, Mott & Dickson report that the landings in the docks in London during April consisted of 203 loads of logs and 185 loads of planks and scantlings, or a total of 388 loads, as against 252 loads for the corresponding month of last year. The deliveries into consumption were 752 loads of logs and 282 loads of planks and scantlings—together 1,034 loads, against 509 loads for April, 1906. This delivery of 1,034 loads is not only far in excess of the scanty imports, but stands out as quite a respectable consumption, in view of the restricted conditions of the market for so long past. Java wood has had a full share of such consumption. It is to be noted that the Continent continues to take a large portion of the small supplies coming from Burmah and Siam, and the still further reduced stock in the London docks does not promise to be much augmented for some time to come.

Mahogany.—This market was fairly active, more particularly for the latter part of the month. Supplies are scarce, and likely to continue to be short of the demand for some time to come. Prices therefore, are firm for all descriptions, and likely to continue to harden.

Abstract of Stock, Consumption, &c., in London Docks, for April.

All Docks.	Deals (Fir).	Battens (Fir).	Pine.	Spruce.	Pitch-pine Deals.	Deals and Battens in Aggregate.	Rough Boards (All Countries).	Flooring.	Floated Timber.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Loads.
1907. Public dock stock -	1,155,008	2,567,275	558,862	781,118	31,838	5,094,101	3,199,931	5,182,982	17,500
Monthly public dock consumption - - - -	249,676	491,408	57,746	115,415	12,522	926,767	438,468	1,008,056	4,190
Overside stock - - -	—	—	—	—	—	—	—	—	—
Overside consumption (veraging of dock):—									
110% per cent. Sawn 63 ,, Planed	274,644	540,549	63,521	126,956	—	1,005,670	482,315	635,075	—
Duration of supply at same rate of consumption - -	2'20 months.	2'49 months.	4'61 months.	3'22 months.	2'54 months.	2'64 months.	3'48 months.	3'15 months.	4'18 months.

ARCHITECTS' LIABILITIES UNDER THE NEW COMPENSATION ACT.

Counsel's Opinion.

The Royal Institute of British Architects has taken the opinion of Mr. Alfred Henry Ruegg, K.C., in regard to the liabilities of architects under the new Compensation Act, which comes into force on July 1st next.

The Clerk of Works.

Counsel gives it as his opinion that the client or building owner will be responsible or actionable for accident or damage that may happen to the clerk of the works, whether he be paid directly by the client or building owner, or by the architect as agent for the client or building owner. If employed and paid directly by the building owner no question can arise; he is clearly the servant of the building owner. If paid by the architect care must be taken to make it quite clear that the architect is only the agent of the building owner.

The Assistant.

Counsel is of opinion that the architect is liable for damage or accident that may happen to his assistant either when employed in his office or when superintending works of buildings in progress.

In each of the above cases it is necessary that the accident should arise out of and in the course of the employment, and that it should not (except where the injury results in death or serious and permanent disablement) be attributable to the serious and wilful misconduct of the injured person himself. It is also necessary (except where the employment can be described as manual labour) that the remuneration should not exceed £250 a year.

The Pupil.

Counsel is of opinion that a pupil articled by indenture in the form used by the R.I.B.A. is a workman within the meaning of the Act; and that the architect to whom he is bound is his employer, and consequently liable as hereafter stated to pay compensation to the pupil or his dependants in case of injury or death arising from accident happening in the course of his employment and arising out of his employment.

An apprentice receiving no salary, however, is, in counsel's opinion, not entitled to weekly compensation under schedule (1) (b) of the Act, for the compensation is based upon the "earnings," and cannot exceed 50 per cent. of such earnings. In case of death also, when no salary has been paid, counsel is of opinion that no compensation becomes payable. But where a small salary is paid by the architect, counsel considers that the pupil would be entitled to receive as weekly compensation a sum not exceeding 50 per cent. of whatever such salary, when computed into weekly payments, amounts to.

If the injury results in death, and the pupil who is receiving a salary leaves dependants wholly dependent on his earnings at the time of death, the dependants would become entitled to a sum equal to the earnings of the pupil for the three years preceding the death, if he has been so long employed, with a minimum of £150. If the pupil had not been employed for three years, then the sum would be 156 times his average weekly earnings during the period of his actual employment as a wage-earning workman.

In case of death, where the dependants are not wholly dependent, such a sum, not exceeding the above amounts, as an arbitrator might think reasonable.

Counsel points out that if the pupil is under 21 years of age at the date of the injury, and his average earnings are less than 20s. a week, he may be awarded 100 per cent., instead of 50 per cent., of such earnings, in case of incapacity, but not in any case exceeding 10s. a week; and where, in such a case, the amount of compensation is reviewed after twelve months, the compensation may be increased to 50 per cent. of the weekly earnings which the workman would probably have been earning at the time of the review, if he had not been injured.

The Architect Himself.

Counsel is of opinion that (except in the unusual case of an architect in the permanent employment of a person or public body, who has contracted to serve such person or public body and to perform his duties under their control, and who receives less than £250 a year) the architect is not a servant or workman of the building owner, and such building owner incurs no liability to him under the Workmen's Compensation Act, 1906. The architect who undertakes to superintend building operations for a commission does not enter into the service of the building owner or contract to serve him. He is in law a contractor, and so long as he carries out the terms of his contract, is quite independent of any control on the part of any building owner.

Obituary.

Mr. David Jenkins, F.R.I.B.A., of Llandilo, died recently.

Mr. W. W. Robertson, F.S.A.Scot., late Principal Architect to H.M. Office of Works, Scotland, died recently.

Mr. W. H. Lees, A.R.I.B.A., district surveyor for Holborn, East Strand, and part of St. Pancras, died last week, aged 63.

Notes on Competitions

Pier Pavilion, Weymouth.

The pier pavilion at Weymouth for which competitive designs are invited is to cost £8,000, exclusive of foundations, lighting, seating and heating. One hundred guineas will be awarded for the selected design, which is to comprise plans, sections, specification and perspective, together with quantities and "bona-fide tender." "A qualified professional man" will be appointed to assist the corporation in making the award. It is hardly necessary to point out that the conditions of this competition are very unsatisfactory. Architects are requested not to compete unless the conditions are amended and brought into line with the Institute regulations.

Secondary School for Boys, Wallasey.

This competition has been decided as follows:—1st, Messrs. Willink and Thicknesse, FF.R.I.B.A.; 2nd, Mr. Richard Holt; 3rd, Mr. Matthew Honan—all of Liverpool. The competition was limited to architects practising in Lancashire and Cheshire, the assessor being Mr. J. Wreghitt Connon, F.R.I.B.A., of Leeds. The school is for about 400 boys.

Elementary School, Hadfield, Glossop.

Designs for this school were sent in by May 7th. It is expected that the assessor will go through the drawings this week. The competition was limited to architects practising within thirty miles of Glossop.

Design for Bungalow.

The Council of the Society of Architects has awarded the first prize (value three guineas) for a bungalow design to Mr. C. H. Hudson, of London, N. (motto, "John Bull"), and an additional prize of one guinea to Mr. H. W. Smith, of Oxford (motto, "Isis").

Technical Institute, Limerick.

For a new technical institute proposed to be erected at Limerick, competitive designs are invited from Members and Fellows of the Royal Institute of the Architects of Ireland who have been for the last five years in independent practice. "Other architects wishing to compete should apply to the Limerick Municipal Technical Schools Committee for permission"—a rather curious announcement. Conditions of the competition can be obtained from the secretary of the committee, Mr. James Comerton, B.A., 69, George Street, Limerick, on payment of a fee of 10s. (In the announcement of the competition there is no statement that this fee will be returned on receipt of a bona-fide design.)

School, Blaydon.

The Durham County Council have selected the design for a new school at Blaydon sent in by Mr. J. Morson, of Durham, who was one of seven architects invited to submit designs.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
May	17	CENTRAL LIBRARY AT BIRKENHEAD.—Limited to local architects. Premiums of 50, 30, and 20 guineas. Conditions from A. Gill, town clerk. Birkenhead. Deposit, One guinea.
June	1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
June	24	REMODELLING OF SMITHFIELD. UTTOXETER (for cattle, sheep, pigs and calves).—Premium £20, for plan, specification and estimate, Particulars from F. S. Hawthorn, clerk, Council Offices, Uttoxeter.
July	1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5, Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth.
July	1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown.
July	6	ZION INSTITUTIONAL CHURCH, MANCHESTER.—Limited to Manchester architects. Particulars from J. S. Gibson, 5, Old Bond Street, London, W.
July	30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth.
Aug.	27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept.	2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept.	11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN.—Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in last week's issue.
1908. March	31	MODEL COTTAGES AT WOLVERHAMPTON.—Particulars in "Builders' Journal." May 1st.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Sewage and Trade Refuse from Cottage Laundry.

BARNET.—DRAINAGE writes: "A cottage standing in about an acre of ground is undrained. The sewer is about a mile distant. The lease says, with usual into a laundry, with the consequence that trade refuse—*i.e.*, soap suds—and sewage find their way into a brook about half a mile away through fields: the brook ultimately joins the Thames about 15 miles distant. The lease says, with usual inflictions as regards rates, "all impositions and outgoings." (1) Who do you consider is liable to deal with sewage and trade refuse—Council, owners, or tenant? (2) If the owners or tenant are liable, can they, under the Public Health Act or other Acts, compel the Council to bring their sewer within 100yds? (3) If not, which is the best and cheapest way of dealing with the matter?"

(1) The Council are certainly not liable, and as the landlord probably let the property merely as a cottage he can hardly be held responsible for the laundry waste. (2) No. (3) The Thames Conservancy will certainly require that no pollution shall enter any stream within their district. Probably the only way possible on this small area is to build a cesspool (not necessarily a watertight one), and then to pump out the contents periodically into settling beds made of earth or ashes. F. S. I.

Windows in Poor Law Buildings.

LONDON.—R. writes: "What is a suitable height from the floor for windows in wards, bathrooms and w.c.'s, and duty rooms in poor law institutions?"

Sick Wards in Workhouses.—With the view of securing a cheerful appearance, the bottom of the windows should not be more than about 3ft. above the floor level, and to ensure adequate movement of and in the upper parts of the wards it has been found advisable that the top should not be more than about 6ins. from the ceiling or the wall-plate, as the case may be. The best arrangement of windows is found to be that which provides for one between every two adjacent beds, with extra windows near the angles of the wards beyond the end beds; movement of air, and such ample light as tends to secure cleanliness, is thus ensured in those parts of the wards standing most in need of such requirements. Having regard to the cheerfulness, to adequate means of lighting and ventilation, and also to the maintenance of an equable and sufficient ward temperature, it has been considered by an eminent authority that the amount of window area to cubic space in the wards should provide for 1 sq. ft. of window area to about 70 cub. ft. The ventilation by the windows must be supplemented by air-pump ventilators and fresh-air inlets; natural systems being most suitable for poor-law purposes, and less costly in upkeep than mechanical appliances. *Bathrooms.*—Where infirm or weakly persons require the assistance of nurses and attendants, a bath so placed in the bathroom that both sides are free for the access of the attendants is to be preferred; the window should therefore be placed where there would be no danger of the bather falling against it, and the height should not be less than 4ft. between the bottom of the window and the floor. *Water-closets.*—The partitions above the closet doors (where there are a number of closets together) should rise to the ceiling, so as to shut them off entirely from the lobby; but the partitions separating them from each other should not be more than 7ft. 6ins. in height, so that, by means of windows placed in the opposite side walls of the sanitary annexe, an independent cross-current of air may be secured through them. The bottoms of the windows at each end must therefore be about 7ft. 6ins. from the floor; if small windows be added for each closet these may have their bottoms 4ft. 6ins. from the floor. *Duty Rooms.*—There should be ample provision for light and ventilation in these rooms, and the bottom of the windows may be about 3ft. 6ins. from the floor.

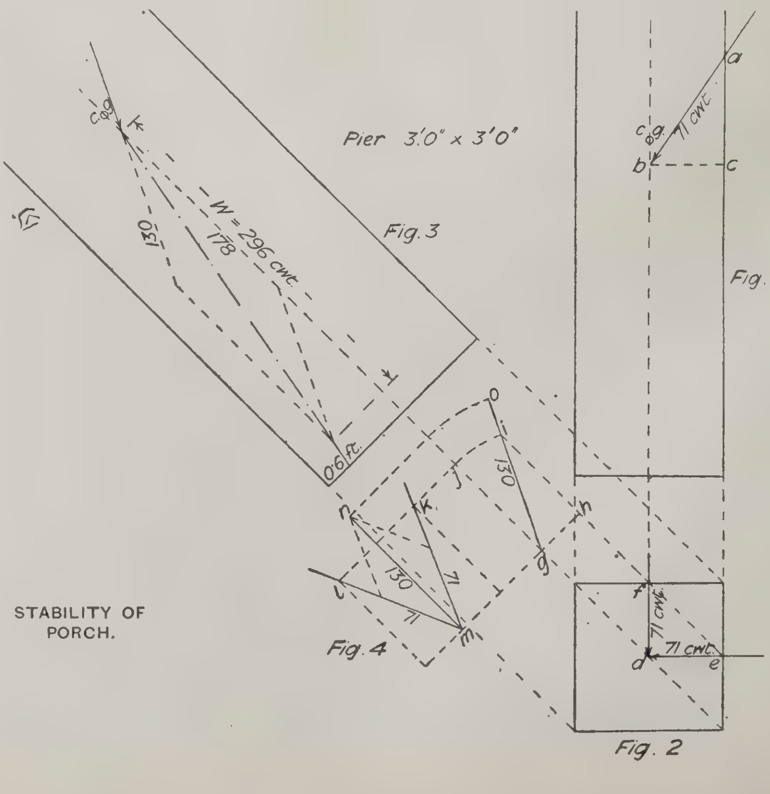
B.

Stability of Porch.

LONDON.—F. W. writes: "Referring to the reply to an enquiry under the above head on p. 43 of your issue for January 23rd, may I ask why the load of 15·6 tons is doubled on account of the second arch, seeing that the greater part of this load is due to the weight of the pier itself? I would also suggest that a more accurate result would be obtained by finding the resultant of the thrusts of the two arches and combining this with the weight of the pier. I think it would then be found that the final resultant would be 259cwts. and that it would fall 2ins. *outside* the angle of pier at its base. I should be glad of an explanation of the $\frac{2}{3}$ in the formula $\frac{2}{3}\frac{W}{d}$ (apparently the minus sign is a misprint) and to know why the strip 2ins. wide along the edge of pier only is considered as having to take the entire pressure. Does not the bonding of the brickwork or masonry distribute it? Is there any means of finding the amount and direction of the load on base of pier if the hoop-iron bond be adopted as suggested?"

The minus between $\frac{2}{3}$ and $\frac{W}{d}$ was a printer's error and should be omitted. The doubling of the thrust from one arch was assumed to be an approximate method of obtaining the final pressure due to the two arches meeting on one pier, but the weight of pier should only have come in once. The full working would be as follows:—Let Fig. 1 be elevation of pier and thrust from front arch, Fig. 2 plan of pier and thrust of both arches, Fig. 3 diagonal elevation of pier. The construction is clear as far as these outlines are concerned. The next step is to find the resultant of the two thrusts in their own plane and to show this on the diagonal elevation. The order of working is shown by the small letters, *gh* projected from plan, *hi*=*ca*, *kl*=*ef*, *lm*. *km* the two thrusts in the plane of the paper, *mn* resultant. This resultant carried back to *go* gives the diagonal thrust on Fig. 3, giving finally the vertical component W=296 tons acting at a distance of 0·6ft. from outer point on the area 3ft. square placed diagonally. The bending moment will be $296\left(\frac{3}{\sqrt{2}} - 0{\cdot}6\right) = 296 \times 1{\cdot}52 = 450$cwt.-ft. The section modulus $= \frac{d^3}{6\sqrt{2}} = {\cdot}118\,d^3 = {\cdot}118 \times 3^3 = 3{\cdot}186$. Then the maximum stresses will be $\frac{W}{A} \pm \frac{M}{Z} = \frac{296}{9} \pm \frac{450}{3{\cdot}186} = 33 \pm 141 = 174$cwts. (say 8·7 tons) per sq. ft. compression, and 108 cwts. (say 5·4 tons) per sq. ft. tension. This compression is rather high for Bath stone, but might possibly be permitted in first-class work with no flaws, to which Bath stone is rather subject. The tension is about the maximum that may be permitted with very carefully-made Portland cement mortar, but if the hoop-iron bond already recommended is inserted the structure will no doubt be quite safe.

HENRY ADAMS.



STABILITY OF PORCH.

Law Cases.

Ancient Lights in Dublin : An Appeal Case.—On May 1st in the Court of Appeal judgment was delivered in the case of *Black v. Scottish Temperance Assurance Co.*, which had been argued on an appeal by the defendants from various orders made by Mr. Justice Barton granting an injunction restraining the defendants from continuing the existence of what he alleged was a nuisance or obstruction to the plaintiff's ancient lights in his woollen clothing factory in James Street South, Belfast. The interference was caused by a lofty pile of buildings which the defendants had erected at a cost of about £60,000 at the corner of Bedford Street and Donegall Square, immediately behind the new City Hall in Belfast, and which overshadowed to a large extent the plaintiff's smaller premises situated adjacent thereto. Subsequent to the original decree the defendants had faced with white glazed tiles the portion of their building from which the light was reflected to the plaintiff's premises, but it was contended that this did not obviate the nuisance, and a mandatory injunction to remove the building was then issued by Mr. Justice Barton.—The Lord Chancellor said the question mainly discussed on appeal was whether damages should be given to the plaintiff by way of compensation in lieu of the mandatory injunction awarded by Mr. Justice Barton. Where trading could and would be continued, as he thought it could be here, though with some inconvenience or dislocation of the business or expenditure in the alteration of a window or windows, there his lordship thought the judicial discretion under the statute might, in the absence of special circumstances, be exercised to give full and adequate compensation in money for a pecuniary loss affecting a continuing trading, while refusing the mandatory injunction. The question here was, could the injury be fairly compensated by damages? He thought it could. The defendants had offered to leave the determination of the damages to the Court, and the sum of £500 had been suggested as a liberal estimate. They could not, however, prevent the plaintiff seeking larger damages through an enquiry; but they could state, in granting an enquiry, that the defendants had offered this sum, and reserved the costs of the enquiry to be determined by the result. As regarded the costs of appeal, the defendants had served a notice of appeal which asked to have the action dismissed. That notice was wholly unsustainable, and, therefore, the defendants must pay the whole costs of the appeal.—Lord Justice Fitzgibbon said he entirely concurred with the opinion the Lord Chancellor had pronounced. There had been a substantial diminution of light to the plaintiff's premises, and the question was whether the relief to be given should be specific relief by the pulling down of the offending building, or whether the plaintiff must rest satisfied with compensation for the injury he had sustained. His lordship thought that money here would place the plaintiff substantially in as good a position as he was before. Mr. Justice Barton had mentioned the sum of £500 as adequate damages to the plaintiff. The defendants had consented to pay that sum; and the Court considered that £500 was a large sum. The plaintiff would have an opportunity of considering whether he would accept £500 and his costs.—Lord Justice Holmes also concurred. He said he would be glad if further litigation in this case were avoided by the plaintiff accepting £500, but he could not be deprived of an enquiry, in which he might receive more, and he might just as likely receive less.

A Case about American Oak Flooring.—In the King's Bench Division of the High Court of Justice recently an action was brought by W. W. Howard Bros. & Co., timber merchants, of London, against Thomas Heath, builder's contractor, of London, for £112, being the balance of the price of certain American oak timber for flooring Euston Hall, Suffolk, the residence of the Duke of Grafton. Defendant counter-claimed for the cost of extra work done by his men, owing to the flooring not being, as he alleged, up to sample.—Mr. Neilson, for defendant, contended that as the flooring was of defective quality, he was compelled to spend more time and labour on the laying and completing of the floor than would have been necessary if the same had been of the quality and condition specified for.—Mr. Heath, in evidence, complained of the defective grooving and tonguing.—Cross-examined by Mr. English Harrison, K.C., witness admitted the American wainscot oak was inferior and more expensive than plain oak. He thought he could comply with the specification by putting in plain American oak flooring.—Mr. Alfred Burr, F.R.I.B.A., said plain American oak made an exceedingly good floor.—For the plaintiffs, Mr. Alexander Howard, member of the plaintiff firm, said the wood they sent to the defendant was the best quality of plain American oak, which had been landed two years previously at Canning Town wharf. He saw the first consignment sent out; it was properly prepared. The other consignments were prepared from the same stack of wood. He went to Euston Hall, and he recognised the same results as he had seen in several cases where fireproof floors were used. He considered plain American oak was only suitable for warehouse flooring, and not for a good job, unless there was considerable planing and finishing.—His lordship, Mr. Justice Joyce, in giving judgment, said he thought the trouble with the wood did not arise from damp, but from improper preparation by the plaintiffs. On that account he found for the defendant on the counter-claim for £124.—Judgment was given plaintiffs for the undisputed balance of their account.

Prosecution for Wrong Description of Slates.—At the Ystrad Police Court recently the Oakeley Slate Quarries Co., Ltd., of Portmadoc, brought an action against the Newport Builders' Supply Co., Ltd., for a breach of the Merchandise Marks Act in applying a false trade description to slates which were supplied by them to Mr. E. J. Davies, builder, of Treherbert.—The slates had been supplied and invoiced as "Oakeley's Old Vein Blue Medium Slates," but had, in fact, not been supplied from the plaintiff company's quarries.—Mr. H. P. Davies, managing director of the defendant company, stated that as manager he was quite innocent of the matter, and that the act complained of had been committed without his knowledge by the firm's agent.—A long legal argument ensued on the question of authority, it being contended that as the defendants' manager was innocent of the matter the defendant company were not criminally responsible for the unauthorised act of a servant.—The Bench decided that the case had been made out, and that it had been proved that Hughes, the defendant company's order clerk, and Jones, their traveller, had authority to deal with the matters of the invoices, and that as they were so authorised the plea of innocence which had been set up on behalf of the manager could not avail. They imposed a fine of £5 and costs on the defendant company.

Workmen's Compensation : £200 for loss of Four Fingers.—At the Liverpool County Court on April 29th a joiner's apprentice named Smith brought an action against a builder and contractor named Fowler for the loss of four fingers. It appeared that Smith was planing a quantity of laths on a gas-driven machine, and whilst engaged in this work four of his fingers were cut off. There was a proper adjustable guard to the machine, but the lad removed this to plane some wide boards, and without replacing the guard he went on planing the thin laths. The jury awarded Smith £200 damages.

Correspondence.

High Grain Bins.

To the Editor of THE BUILDER'S JOURNAL.

SIR,—With reference to the letter from The Ferbeck Chimney Construction Co. in your issue for April 10th, which I have only just seen, my mode of determining the pressure did not assume the grain to be a fluid but was in the nature of a comparison as follows: If water or anything else with unlimited area and a natural slope of 0 degs. produces a pressure of $\frac{1}{2}wh^2\tan^2\frac{90-0}{2}=\frac{1}{2}wh^2$, then the pressure produced by grain or anything else with a natural slope of 30 degs. will be $\frac{1}{2}wh^2\tan^2\frac{90-30}{2}=\frac{1}{6}wh^2$. Again, if water with a total pressure of $\frac{1}{2}wh^2$ gives a pressure at the base of wh, grain with a total pressure of $\frac{1}{6}wh^2$ will give a pressure at the base of $\frac{1}{3}wh$; but the weight of grain is, say, 50 lbs. per cub. ft., and water 62·5 lbs. per cub. ft., so that the pressure at the base in lbs. per sq. ft. due to water will be 62·5 and that due to grain $\frac{1}{3}\times 50h$, or water would produce a pressure $\frac{62{\cdot}5}{\frac{1}{3}\times 30}=$ 3·75 times as much as that assumed for the grain—Yours truly,

HENRY ADAMS.

Laying-Out of Riddrie Estate, Glasgow.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—Competitive designs were invited by the Corporation of Glasgow for laying out the Riddrie Estate. The plans have been lodged for months past, but so far as I know nothing has been heard of the matter since. Could you inform those who were foolish enough to compete when a decision is likely to be arrived at?—Yours truly, COMPETITOR.

[We wrote to the town clerk in regard to the above, but have not received a reply.—ED., B.J.]

Liverpool Architecture.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—In the report of Mr. F. W. Simon's paper on the above subject before the Architectural Association, it is stated that "the Picton Reading-room or

Rotunda was erected in 1860 from the designs of Mr. Thomas Allom." This is not correct. The Picton Reading-room was not erected until after the Walker Art Gallery, and from the designs of the same architect—namely, Mr. C. Sherlock. The Brown Library and Museum was erected about 1860 from modified designs of the late Mr. Thomas Allom, who was awarded the first prize in the competition, the architect who carried out the work being the late Alderman Weightman, then architect and surveyor to the Corporation of Liverpool, who also designed the Municipal Offices, which were completed under the supervision of Mr. E. R. Robson, who succeeded Mr. Weightman in 1864.—Yours truly,

LISCARD. EDMUND WINTER.

Bishop Auckland School Competition.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—I am obliged to you for publishing my letter in reference to the above. May I again trespass on your valuable space to reply to "The Writer of the Critique"?

The points mentioned by me are not "trifling," but "governing." A class-room for 24 pupils must be 22ft. 6ins. by 20ft. 6ins., and that for 25 pupils 19ft. by 23ft. 6ins. These sizes *govern* the plan, and also the roof. The amount of projection necessary is 3ft. 6ins., which is not likely to overshadow the adjoining class-room to any great extent. The assembly hall, as shown on the first-premiated design, is more than large enough for the "future" school (let alone present requirements), being 2,550ft. super; that is, 150ft. over required area of future and only 1,050ft. that of the present school. They evidently will not require the end corridor also, as suggested by "The Writer of the Critique."

Dealing with the cube, for the sake of economy, would it not have been by far the best plan to have had an upper floor over the class-rooms, and thus saved in the foundations?

Other competitors will, I am sure, agree with me that the sizes of the class-rooms and assembly hall are far from "trifling." Competitors like fairness and adherence to the conditions supplied. In this competition I am afraid that both have been wanting.—Yours truly,

COMPETITOR.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—I am surprised that no one has pointed out that the winning design for the above transgresses the Board of Education regulations in two respects—namely (1) In one of the class-rooms of the future extension left-hand light is obtained at the expense of the space between the front row of desks and the wall behind the teacher, which is only 6ft. 6ins., instead of 7ft. 6ins., as required by the regulations; (2) "Not less than 2ft. should be allowed for every scholar at the table," but in the dining-room 1ft. 9ins. only is provided. And it is not very clear what the end walls of this room stand upon; if on girders, one end of each has its bearing over an opening. But this, I believe, is not an unusual method of construction in competition designs.

As to the size of the hall, "Competitor" is undoubtedly right, for the meaning of the conditions and answers to queries is sufficiently obvious. The hall in the winning design is certainly large enough for 250 children, for it is 150ft. super. larger than necessary for the completed school of 400, and that it has to be still further extended is scarcely a point in its favour.

I do not think the design placed first can be very economical in cube. In the absence of sections or elevations it is impossible to say definitely, but it apparently exceeds my cube by about 37,000ft.—Yours truly, REGULATIONS.

IN PARLIAMENT.

(By our Press Gallery Representative.)

Kensington Palace and Wren's Orangery.

In the House of Commons recently Sir George Fardell asked the First Commissioner of Works if he could state when the plant-houses and forcing-frames for the plants required for the service of the Royal parks, which stand in Kensington Gardens and spoil the architectural effect of the Palace and of Wren's orangery, would be removed to the enclosure in Hyde Park, the area occupied at present by the houses and frames, when vacated, being laid out as an ornamental garden, an improvement foreshadowed in the answer given by his predecessor in office.

Mr. Harcourt: "As I stated in the discussion on my estimates, I hope to be able to carry out this work at the end of this year and to undertake the ornamental garden next year, if funds are provided."

Assouan Dam Contract.

Sir E. Grey informed Mr. Bowles that an offer of £1,037,000 by Messrs. Aird for the raising of the Assouan Dam by more than 25ft. had been accepted. Mr. Bowles enquired whether other firms were invited to tender, but Sir E. Grey asked for notice of the question.

New London Buildings

At last week's meeting of the London County Council the Building Acts Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics*:—

Drawings submitted by A. S. Tayler, of a new upper hall to be erected at the Durning Mission Hall, Elsa Street, Limehouse. (*Consent.*)

Drawings, submitted by Tarrant and Walker, of a concert hall proposed to be erected in Balham High Road. (*Consent.*)

Buildings upon the site of Nos. 247-257 (odd numbers only) inclusive, King's Road, Chelsea, on the further application of W. E. Clifton, on behalf of the Venerable Archdeacon Bevan. (*Consent.*)

Workshop buildings on the southern side of Childers Street, Deptford, between Rolt Street and the "Lord Palmerston" public-house, on the application of Stock, Page & Stock, on behalf of J. Stone & Co., Ltd. (*Consent.*)

Buildings upon the site of Nos. 183 to 195 (odd numbers only), inclusive, Kensington High Street, Kensington, on the application of Chesterton & Sons, on behalf of C. F. Kearley, H. Stokes, C. H. Lorberg, A. W. Pettit, and A. C. Goad.. (*Consent.*)

Bay windows, porches and hoods in front of fourteen houses on the northern side of Kelfield Gardens, Kensington, on the application of Trant, Brown & Humphreys, on behalf of Daly & Franklin. (*Consent.*)

Buildings on the south-eastern side of Perry Hill, Catford, south-westward of Castlands Road, on the application of A. R. Westworth, on behalf of A. Cooper. (*Consent.*)

Addition to a stable building at No. 1a, Greville Place, Maida Vale, Hampstead, on the application of J. S. Oatley, on behalf of A. R. Musgrave. (*Consent.*)

Projections and balconies at a building on the site of Nos. 8 to 12, Margaret Street, and No. 12, Great Titchfield Street, St. Marylebone, on the application of J. W. Simpson and M. Ayrton, on behalf of Max Lindlar. (*Consent.*)

Wooden fascia and soffit to proposed flats on the eastern side of Lyham Road, Brixton, on the application of H. J. Capell, on behalf of A. E. Peacock. (*Consent.*)

Three oriels, two turrets and two balconies at Wellington House, Buckingham Gate and York Street, Westminster, in connection with the application of Palgrave & Co. (*Consent.*)

Projecting bay window in front of No. 9, Beechhill Road, Eltham, on the application of J. J. Bassett, on behalf of A. Cameron Corbett. (*Consent.*)

Building on the northern side of Hanover Square, Westminster, to abut upon the eastern side of Harewood Place, on the application of G. D. Martin. (*Refusal.*)

Building on the western side of Sugden Street, Camberwell, and abutting upon the southern side of Depot Street, on the application of A. C. Remnant, on behalf of S. Lamb. (*Consent.*)

Buildings upon the site of Nos. 63, 65, 67 and 69, Hoxton Street, Hoxton, on the application of G. H. Lovegrove. (*Consent.*)

Motor shed at the rear of No. 19, St. Mary Abbott's Terrace, Kensington, and abutting upon Holland Park Road, on the application of O. S. Doll. (*Consent.*)

Building at the rear of No. 45, Herbert Road, Woolwich, abutting upon May Place Lane, and upon a passageway leading from May Place Lane to Herbert Road, on the application of J. Morran. (*Refusal.*)

One-storey florist's shop on the eastern side of Turner Road, Lewisham, southward of No. 55, on the application of Macintosh & Newman, on behalf of J. M. Prichard. (*Refusal.*)

Projecting one-storey addition in front of No. 3, Newcombe Street, Kensington, on the application of E. W. Fagg, on behalf of Professor F. T. G. Hobday. (*Refusal.*)

Factory building on the north side of Fann Street, Aldersgate Street, City, at the corner of Hot Water Court, on the application of P. B. Tubbs. (*Consent.*)

Formation or laying out of a new street for carriage traffic to lead out of the north-west side of New Park Road, Brixton, on the application of Douglas, Young & Co., on behalf of F. W. E. Hookey, W. J. Pearn, W. T. Key, and R. W. Brading. (*Consent.*)

Formation or laying out of a street for carriage traffic in continuation of Winscombe Street, St. Pancras, on the application of G. Taft, on behalf of Mr. Edser. (*Refusal.*)

Building upon a site abutting upon Oxford Street, Duke Street and Somerset Street, St. Marylebone, in connection with the application of D. H. Burnham & Co., on behalf of Selfridge & Waring, Ltd. (*Refusal.*)

At yesterday's meeting of the Council the Building Act Committee reported the following applications:—

Addition to the Free Home for Destitute Boys, Nos. 2 and 4, Rectory Grove, Clapham, to abut upon Larkhall Rise, on the application of C. E. Hutchinson, on behalf of A. Russell-Baker. (*Consent.*)

Porches in front of six semi-detached houses on the Grove House Estate, abutting upon The Avenue, Grove Park, Lee, on the application of S. S. Dottridge, on behalf of the London and General Estates Co., Ltd. (*Consent.*)

Wrought-iron lamp in front of the Tottenham Court Road Station of the Central London Railway, Oxford Street, on the application of H. H. Holt, on behalf of the Central London Railway Company. (*Consent.*)

Wooden oriel window in front of No. 8, Charles Street, St. James, on the application of F. W. Hunt, on behalf of the directors of the London and Westminster Bank, Ltd. (*Consent.*)

Iron and glass covered way in front of No. 34, Vereker Road, West Kensington, on the application of T. Brown. (*Refusal.*)

Iron and glass shelter at the Piccadilly Hotel, to abut upon Regent Street, on the application of W. Woodward. (*Refusal.*)

Iron and glass shelter in front of Kettners Restaurant, Church Street, Soho, on the application of G. Keeling, Teale & Co., Ltd., on behalf of Kettners. (*Refusal.*)

Addition to Christ Church Schools, Rotherhithe, on the application of A. H. Ryan-Tenison, on behalf of the vicar and managers of the schools. (*Refusal.*)

Building at less than the prescribed distance from the centre of a footway leading from Hilliards Court to Cinnamon Street, Wapping, on the application of Fair & Myer, on behalf of A. Jacob & Co. (*Refusal.*)

Iron and glass skylight over the basement in front of the Star Coffee Tavern, James's Street, St. Marylebone, on the application of E. W. Hobkirk, on behalf of the Ossington Coffee Tavern Company. (*Consent.*)

Building on the eastern side of Willow Vale, Uxbridge Road, Hammersmith, and of an addition at the rear of No. 122, Willow Vale, on the application of A. G. Channer, on behalf of J. Watts. (*Refusal.*)

Two houses on the eastern side of Sydenham Park Road, Lewisham, southward of "Dunkeld," with an irregular open space at the rear and with projecting wooden entrance porches, on the application of W. F. Gritten, on behalf of W. Rogers. (*Consent.*)

Picture gallery at the roof level of Waring & Gillow's new premises, Nos. 164 to 182, Oxford Street, in connection with the application of R. F. Atkinson, on behalf of Waring & Gillow. (*Consent.*)

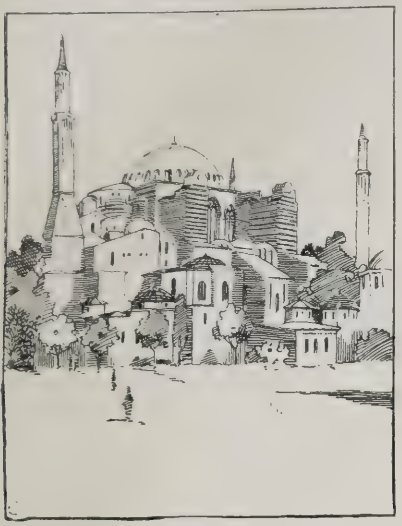
Boiler-house extension at the Grove Road Generating Station, Grove Road, St. Marylebone, on the application of C. S. Peach, on behalf of the Central Electric Supply Co., Ltd. (*Consent.*)

Uniting of Nos. 153 and 155, Highgate Road, St. Pancras, on the application of J. French. (*Refusal.*)

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Fifteenth Series.)

CLASS A (ARCHITECTURE).



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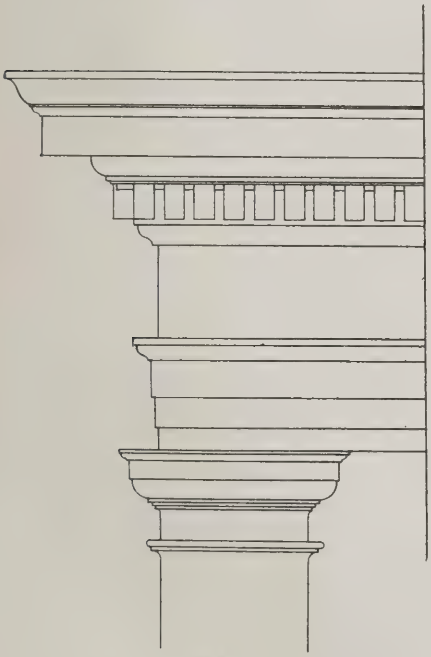

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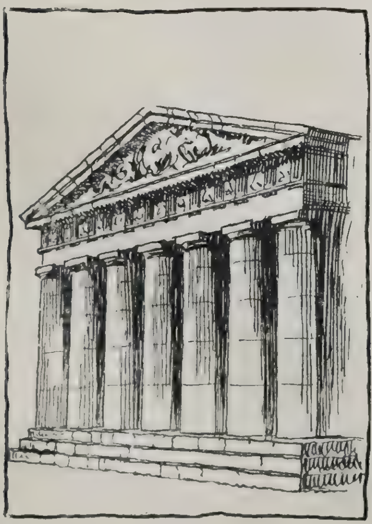


A 42

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Price.—£10

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

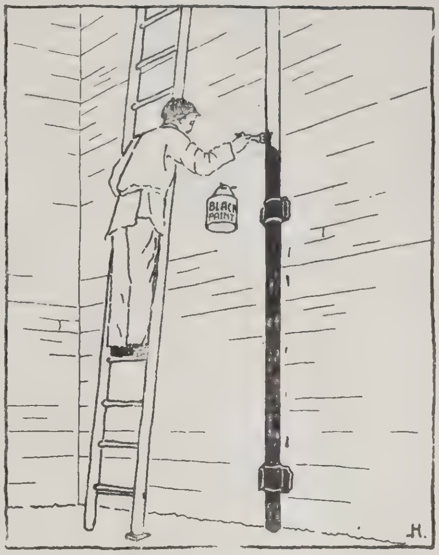
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any volation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

(For Coupons see page xx.)

Copies of "THE BUILDERS' JOURNAL" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.

CLASS B (BUILDING).



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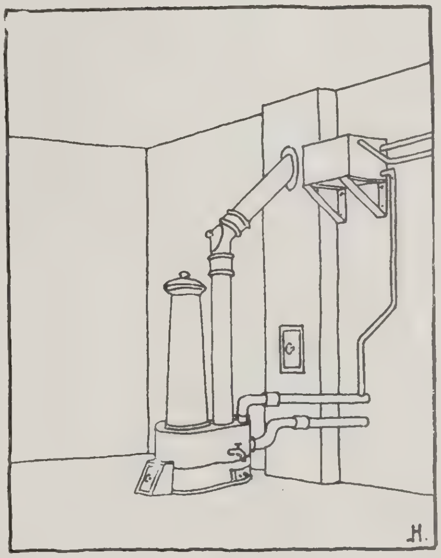

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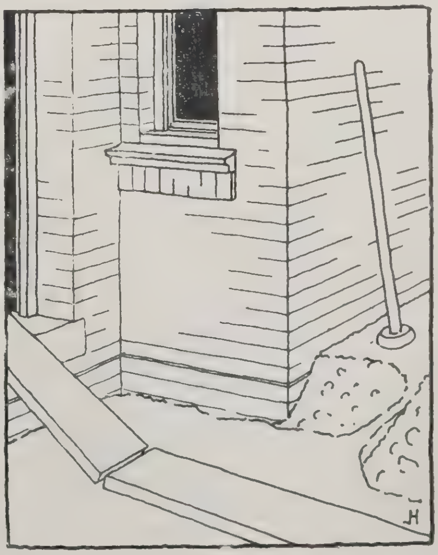

B 45

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Acle (Norfolk).—For the restoration of the north porch and south turret of the tower of Acle Church. Mr. Herbert J. Green, architect and diocesan surveyor, 31, Castle Meadow, Norwich.

	£	s.	d.
Reuben Shanks, Chatteris, Cambs	£563	0	0
R. Chapman, Hanworth...	535	0	0
W. Utting, Acle	488	12	2
Jermy, South Walsham	468	13	9
R. W. Riches, Postwick	453	3	9
A. E. Daniels,* Acle	452	16	3

* Accepted conditionally.

Alphington (near Exeter).—For the erection of a new infants' school for 120 children; also for work in connection with remodelling the offices of the existing school, alterations to drainage, playgrounds, &c.; for the Devon County Education Authority:—

	£	s.	d.
F. A. A. Stacey, Newton Abbot	£2,215	0	0
S. Ellis & Sons, North Tawton	2,120	0	0
W. Perkins & Co., Alphington	2,099	3	11
S. Roberts, Plymouth	1,935	16	8
Westcott, Austin, and White ...	1,874	0	0
J. Crockerell, Plymouth	1,852	10	3
R. E. Narracott, Stoke Gabriel...	1,827	7	1
J. Triggs	1,773	10	10
Ham and Passmore	1,728	2	0
F. J. Badcock, Ashburton ...	1,726	4	7
Stephens & Son	1,692	0	0
Woodman & Son	1,626	13	6
W. G. Coles, Alphington*	1,372	9	0

* Provisionally reserved for acceptance.
Rest of Exeter.

Cambridge.—For the erection of masters' common rooms, art school, armoury and gymnasium, at the Leys School, for the Governors. Mr. Robert Curwen, A.R.I.B.A., architect, 112, Hamilton House, Bishopsgate Street Without, London, E.C.

	£	s.	d.
E. Lawrance & Sons	£3,440	0	0
Bowman & Sons	3,143	0	0
Wm. Saint	2,899	0	0
Coulson & Lofts	2,870	0	0
Kerridge & Shaw,* Sturton Street, Cambridge...	2,777	0	0

* Accepted.

Consett (Durham).—Accepted for the erection of proposed new building premises in Middle Street, for Mr. Joseph English. Mr. John J. Eltringham, architect, Hawthorn Terrace, Blackhill:—

	£	s.	d.
W. Ayton & Sons, George Street, Blackhill	£1,226	15	8

Didsbury (Manchester).—For the erection of a residence in Oakfield Road, for Mr. J. Majdalany. Messrs. C. K. and T. C. Mayor, architects, 41, John Dalton Street, Manchester:—

	£
Hill and Heys	£1,992
Young, Tinker & Young	1,926
G. Macfarlane & Son	1,909
Peace & Norquoy...	1,886
J. Ramsbottom	1,879
W. Thorpe	1,864
S. Megarity & Co.	1,823
Burgess & Galt,* Ardwick	1,770

* Accepted.

Elgin.—For the construction of sewage-disposal works at Pans, Elgin, for the Town Council:—

	£	s.	d.
G. Pirie & Sons, Aberdeen ...	£5,522	16	3
A. Nicholson	4,990	4	4
Septic Tank Co., London (irregular)	4,750	0	0
G. Mackay & Son, Edinburgh...	4,724	17	1
J. Ross	4,636	1	6
W. White & Co., Glasgow	4,233	19	3
Sellar & Co., Aberdeen	3,998	0	0
W. Fraser	3,753	7	8
A. Falconer	3,607	17	10
J. Newlands*	3,083	6	6
A. Davidson & Son (withdrawn)	2,958	12	0

* Accepted.
Rest of Elgin.

Hereford.—For the erection of a cabinet factory for Messrs. Greenlands, Ltd. Messrs. Groome & Bettington, architects, Palace Chambers, Hereford:—

	Foundations, &c., for Factory.	Iron Buildings.	Total.
J. T. Jones	£2,218 3 7	£378 19 5	£2,597 3 0
Walters & Son, Bristol	2,164 0 0	333 0 0	2,497 0 0
Beavan & Hodges	2,146 0 0	338 0 0	2,484 0 0
W. P. Lewis & Co.	2,190 0 0	275 0 0	2,465 0 0
Charles Cooke	2,047 0 0	355 0 0	2,402 0 0
A. J. Colborne, Swindon	2,067 6 2	284 15 0	2,352 1 2
S. Roberts, Plymouth	1,998 0 0	300 0 0	2,298 0 0
W. Powell...	1897 0 0	327 0 0	2,224 0 0
J. Dallow & Son, Birmingham	1,900 0 0	272 0 0	2,172 0 0
E. W. Wilks...	1,905 0 0	240 0 0	2,145 0 0
W. Bowers & Co.*	1,847 0 0	259 0 0	2,106 0 0

* Accepted.
Rest of Hereford.

London, E.—For alterations and improvements at Cayley Street School, Limehouse, for the L.C.C. Mr. T. J. Bailey, architect (Education):—

	£
F. & F. J. Wood, Mile End	£15,578
Treasure & Son, Upper Holloway ...	14,073
McCormick & Sons, Essex Road ...	13,651
Perry & Co., Bow	13,578
J. Greenwood, Ltd., London Bridge	13,498
E. Lawrance & Sons, City Road ...	13,442
Kirk & Randall, Woolwich	13,337
J. & C. Bowyer, Upper Norwood ...	13,177
Patman & Fotheringham, Ltd., Islington	13,123
J. & M. Patrick, Wandsworth	£13,029
F. & E. Davey, Ltd., Southend-on-Sea	12,427
C. Wall, Ltd.,* 4, Lloyd's Avenue...	12,210
J. Chessum & Sons, Bow	11,270

* Recommended for acceptance.

Architect's estimate, £13,760. Messrs. Chessum asked to be allowed to withdraw their tender owing to a serious error having been made in it.

London, W.C.—For providing and fixing electrically-driven ventilating fans at the new Central School of Arts and Crafts and London Day Training College, Holborn, for the L.C.C.:—

	£	s.	d.
Rochdale Electric Co., Ltd., Shawdough, Rochdale (incomplete)			
Sturtevant Engineering Co., Ltd., London	£1,383	17	0
Wilson Wolf Engineering Co., Ltd., London	1,313	0	0
C. Pullen, Bradford	1,245	0	0
Electrical Company, Ltd., London	1,185	15	0
A. W. Penrose & Co., Ltd., London	1,110	0	0
Standard Engineering Co., Ltd., Leicester	1,033	1	6
Electric and Ordnance Accessories Co., Ltd., Aston Manor	1,019	0	0
Ashwell & Nesbit, Ltd., Leicester	938	10	0
Davidson & Co., Ltd., London	841	0	0
Musgrave & Co., Ltd., London...	795	0	0
Matthews & Yates, Ltd., Swinton	740	0	0
Alldays & Onions Pneumatic Engineering Co., Ltd.* Great Western Works, Birmingham	693	0	0

* Recommended for acceptance.
Engineer's estimate, £705.

Portsmouth.—For the construction of Southsea Parade Pier and landing stage:—

	£
R. H. B. Neal & Co.	£7,112
Muirhead & Co.	6,600
Playfair & Toole	5,250
Fasey & Son	5,010
Bevis*...	4,820

* Accepted.
Engineer's estimate, £4,832.

Coming Events.

Thursday, May 16.

Society of Architects.—Mr. E. W. Harvey Piper on "Two Benedictine Minsters," at 8 p.m.

Carpenters' Company.—Prof. R. Elsey Smith, F.R.I.B.A., on "Conversion of Timber: Strength, and How to Test it: Decay and Preservation," at 7.30 p.m.

Friday, May 17, to Monday, May 20.

Architectural Association (Camera and Cycling Club).—Whitsuntide Excursion to Lincoln and district.

Saturday, May 18.

Junior Institution of Engineers.—Visit to scientific instrument works of Messrs. W. F. Stanley & Co. and the Stanley Technical Trade Schools at South Norwood, at 3 p.m.

Tuesday, May 21.

Edinburgh Architectural Association.—Associates' visit to Glasgow.

Saturday, May 25.

Edinburgh Architectural Association.—Visit to Dalkeith Palace and Chapel.

Monday, May 27.

Royal Institute of British Architects.—Meeting at 8 p.m., Report of Reinforced Concrete Committee.

Tuesday, May 28.

Architectural Association of Ireland.—President's valedictory address; election of officers for session 1907-1908.

Architectural Association (Camera and Cycling Club).—Annual general meeting, at 7.30 p.m.

Royal Institute of British Architects.—Special general meeting to consider conditions and instructions for London County Hall Competition, at 8 p.m.

Bankruptcies.

During the week ending May 10th thirty-two failures in the building and timber trades in England and Wales were gazetted.

A. E. Pryer, builder, Bedford. R.O., May 3.

C. Rickatson, builder, Handsworth. R.O., May 2.

J. T. Chapman, builder, Wimbledon. R.O., May 2.

Mason & Co., builders, Uttoxeter. R.O., April 29.

S. Davies, architect and surveyor, Frodsham. R.O., May 2.

D. B. Jones, builder and contractor, Llanelly. R.O. May 1.

MacCullum Bros., builders, Tooting. P.E. Croydon C.C., May 28, at 11.

E. M. Davies, builder and contractor, Cymaman. Liabilities, £1,282; deficiency, £1,269.

Ll. Marsden, builder, Oldham. First meeting, O.R.'s, Oldham, May 15, at 3. P.E., Oldham C.C., June 28, at 11.

J. O. Pickering, builder and contractor, Hornsea. Secured creditors, £5,593; liabilities unsecured, £642; estimated nett assets, £622.

H. C. Stock, builder, Bristol. First meeting, O.R.'s, Bristol, May 15, at 12. P.E., Guildhall, Bristol, May 31, at 12. R.O., May 2.

C. M. Greenwood, builder, Gainsborough. First meeting, O.R.'s, Lincoln, May 15, at 12. P.E., Sessions House, Lincoln, June 6, at 3.

S. Watson, builder, Haltwhistle. Gross liabilities, £2,448; £932 expected to rank for dividend; assets estimated at £58; deficiency, £874.

A. Jones, painter and decorator, Bristol. First meeting, O.R.'s, Bristol, May 15, at 11.45. P.E. Guildhall, Bristol, June 7, at 12. R.O. May 2.

F. W. Booth, builder and undertaker, Fairfield. First meeting, O.R.'s, Stockport, May 16, at 11.30. P.E., Stockport C.C., May 31, at 10.15. R.O., April 30.

Current Market Prices.

FORAGE.

		£ s. d.	£ s. d.
Beans...	per qr.	1 11 0	1 13 0
Clover, best...	per load	4 7 0	4 17 6
Hay, good	do.	4 0 0	4 5 0
Sainfoin mixture	do.	4 0 0	4 7 6
Straw...	do.	1 8 0	1 14 0

METALS.

Standard Copper	per ton	101 0 0	102 0 0
Do. Strong sheets ...	do.	120 0 0	121 0 0
Lead, soft foreign... ...	do.	19 10 0	19 15 0
Do. English	do.	20 5 0	20 7 6
Do. pipes...	do.	23 5 0	23 7 6
Do. sheets	do.	22 12 6	22 15 0
Galvanised Corrugated sheets	do.	13 12 6	13 15 0
Spelter G. M.	do.	26 0 0	26 5 0
Angles, Scotland	do	7 2 6	7 5 0
Bars, do.	do.	8 2 6	8 5 0
Marked bars, Staffs. ...	do	8 17 6	9 0 0
Common bars, do. ...	do.	6 17 6	7 0 0
Angles, M'boro.	do.	7 0 0	7 2 6
Joists do.	do.	6 15 0	6 17 6
Angles, Midlands	do.	7 5 0	7 7 6
Joists do.	do.	7 5 0	7 7 6
Girder plates, Midlands ...	do.	8 0 0	8 2 6
Angles, Foreign, c.i.f. Thames	do.	7 5 0	7 7 6
Tees do. do. do.	do.	7 7 6	7 10 0
Joists, do. do. do.	do.	6 7 6	6 10 0
Channels do. do. do.	do.	6 10 0	6 12 6
Tin, Foreign	do.	192 0 0	193 0 0
Do. English ingots ...	do.	197 0 0	198 0 0
Zinc, sheets, Silesian, ...	do.	30 0 0	30 10 0
Do. do. V.M. ...	do.	30 10 0	31 0 0

TIMBER.

Deals, Archangel, White, 2nd, 3×9	per std.	9 10 0	—
Do. Constanza, White, 3rd, 3×11	do.	8 15 0	—
Do. do. do. do. 3×9	do.	9 0 0	—
Do. Kungsgarden, Yellow & White, 3×9	do.	5 10 0	—
Do. Langrör, Yellow, 3rd, 3×7	do.	11 0 0	—
Do. do. do. 4th, 3×7	do.	10 0 0	—
Do. Montreal, Spruce, 2nd, 3×9	do.	9 15 0	—
Do. do. Pine, 1st, 3×11	do.	21 0 0	—
Do. Riga, Yellow, 1st & 2nd, 3×8	do.	8 0 0	—
Do. do. do. do. 2½×7	do.	8 5 0	—
Do. St. John, Spruce, 1st, 2nd & 3rd, 3×9	do.	8 15 0	9 0 0
Do. do. do. do. 3×7	do.	7 15 0	—
Do. Skelleftea, Yellow, 1st, 2½×8	do.	9 10 0	—
Do. do. do. do. 2½×7	do.	10 0 0	—
Do. Wasa (Wasklot), Yellow, unsorted, 2½×7	do.	9 10 0	—
Battens, Altappen, Yellow, 2nd, 2×8	do.	9 15 0	—
Do. Ingramport, Yellow, unsorted, 2×4	do.	7 5 0	—
Do. Koivnsaari, Yellow, unsorted, 1×4	do.	8 10 0	—
Do. Langrör, Yellow, unsorted, 2½×6	do.	9 5 0	—
Do. Oscarsham, Yellow, unsorted, 2×4	do.	8 5 0	9 10 0
Do. St. Petersburg, Yellow, 3rd, 2½×6½	do.	8 10 0	—
Do. Skelleftea, Yellow, 1st, 2½×6	do.	9 0 0	—
Do. do. do. do. 2×6	do.	9 10 0	—
Do. do. do. do. 2×4½	do.	9 0 0	—
Do. do. do. do. 2×4	do.	9 15 0	—
Do. do. do. do. 2×3	do.	9 0 0	—
Do. do. do., unsorted, 2×7	do.	9 10 0	—
Do. do. do. do. 2×3	do.	9 0 0	—
Do. Wasa (Wasklot), Yellow, unsorted, 2×4	do.	9 10 0	—
Do. do. do. do. 2×3	do.	9 0 0	—
Flooring Boards, Fredriksstad, White, 3rd, 1×7	do.	0 9 3	—
Do. do. do. do. 1×6	do.	0 8 9	—
Do. Yellow, do. 1×7	do.	0 10 6	—
Do. do. unsorted 1×6	do.	0 10 0	—
Do. do. Yellow and White, 1×7	do.	0 8 3	—
Do. do. Mixed Yellow 1×6	do.	0 9 9	—
Do. Mon, Yellow, 1st, 1×6	do.	0 12 0	—
Do. do. do. do 2nd, 1×6	do.	0 11 0	—
Do. Soderham, White, 1st & 2nd, 1×7	do.	0 10 6	—
Do. do. do. do. 1×6	do.	0 10 0	—
Do. Skonvik, Yellow,6 1st, 1×	do.	0 10 9	—

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Supplement to
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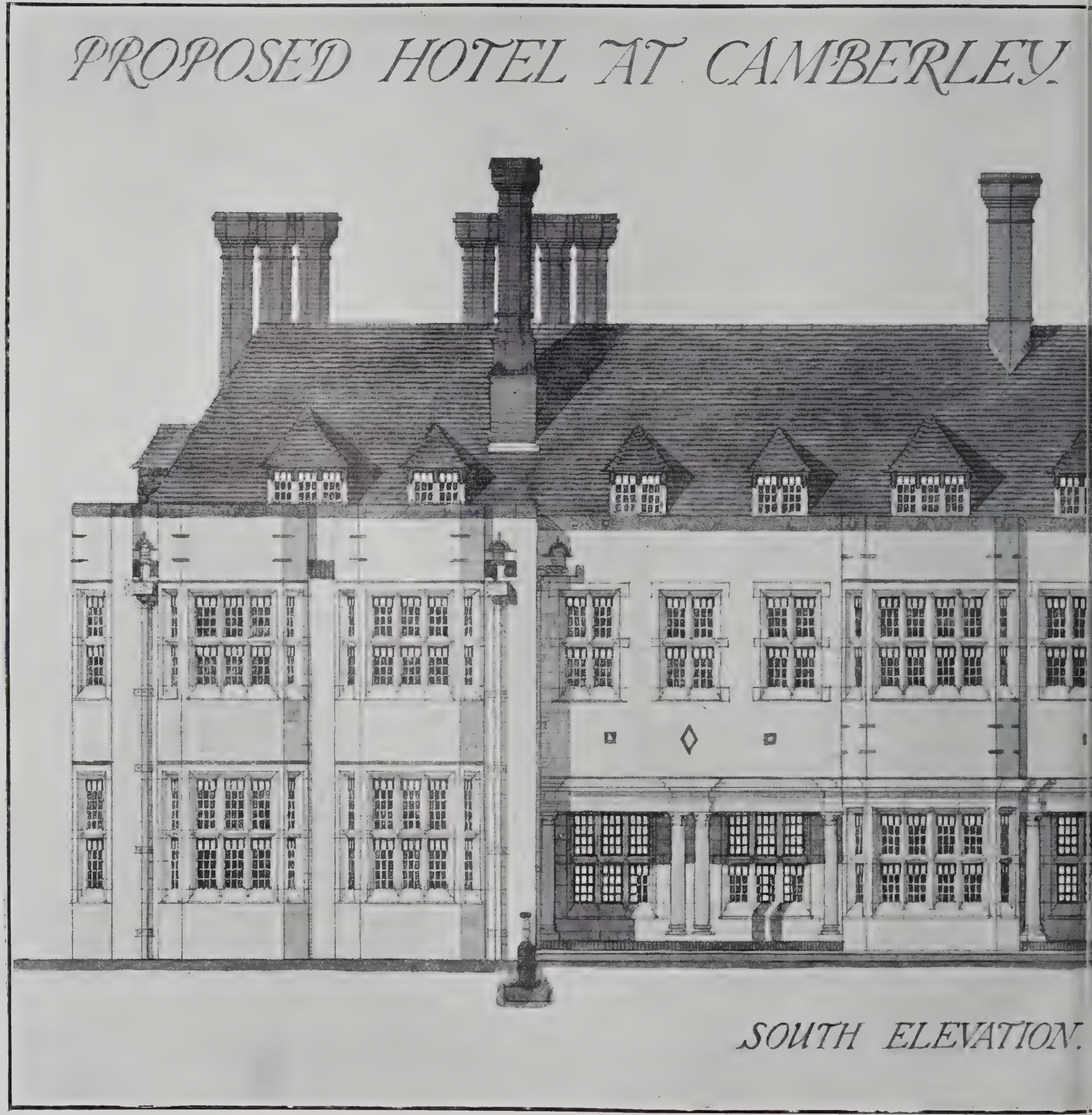
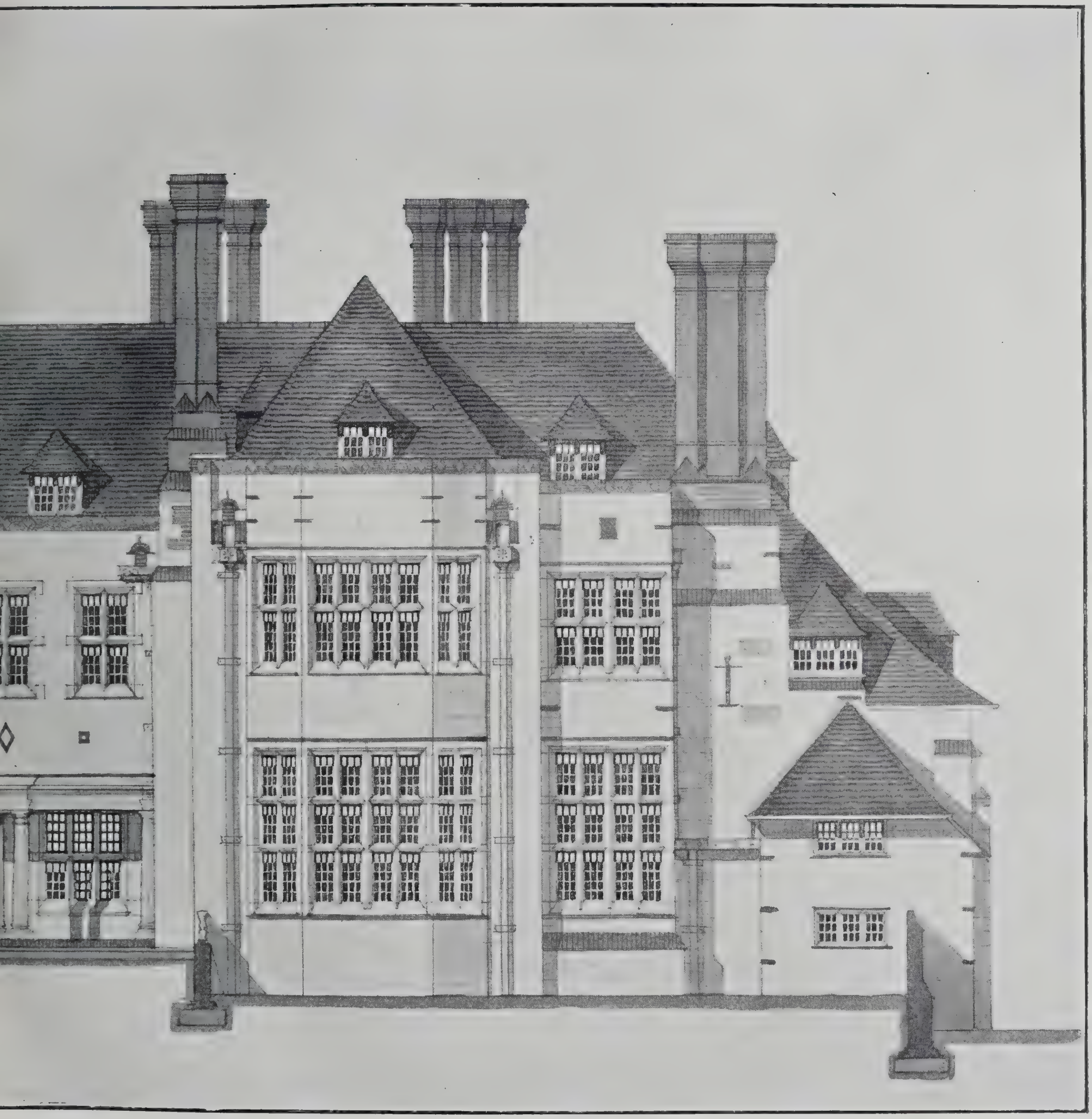
Wednesday, May 22nd, 1907.



H. R. AND B. A. POULTER, ARCH



(*Royal Academy Exhibition*, 1907.)

May 22, 1907. Volume 25, No. 641

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The **"Concrete and Steel Supplement"** is given in this issue.

The Subscription Rates per annum are as follows:—

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By post in the United Kingdom	10s.	10d.
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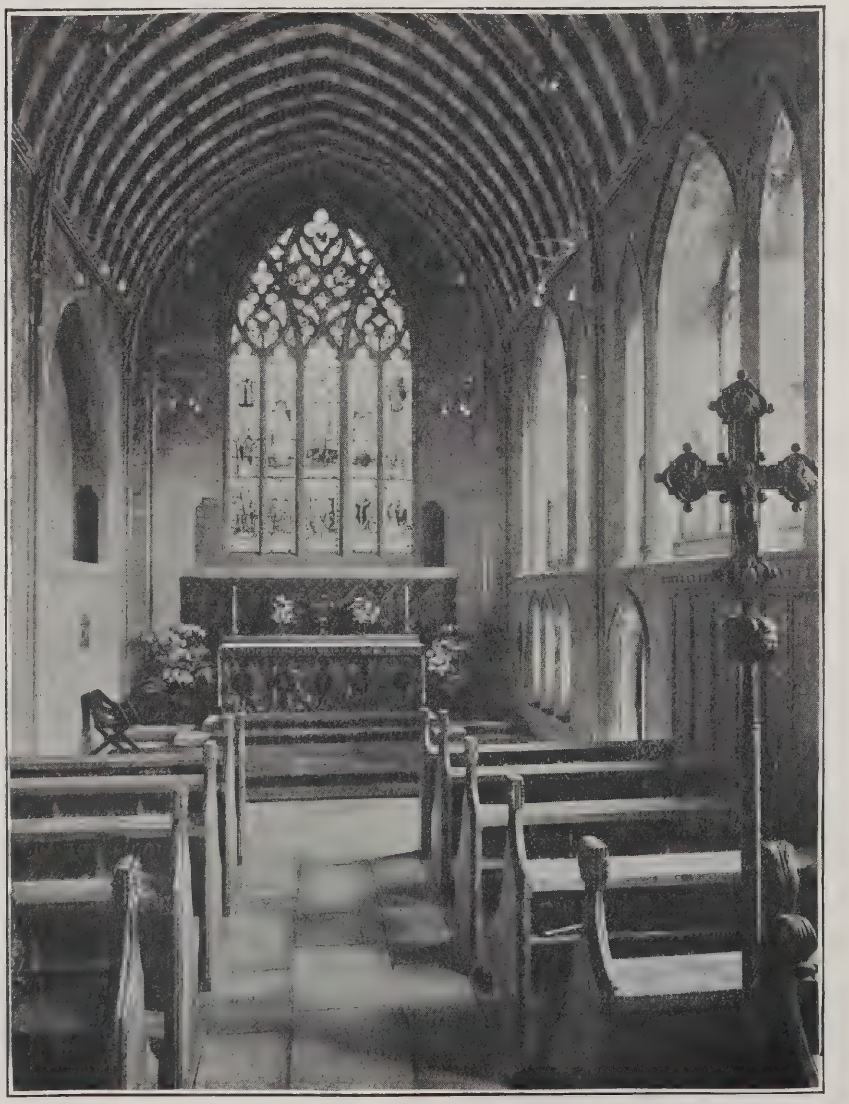
A Preliminary to Registration. In our issue for August 8th last we dealt with the question of architects' registration as raised by the passing of the Irish Labourers Act, in which a clause had been introduced relating to the employment of architects in connection with work under that Act, providing that every person so engaged should satisfy the Local Government Board that he was qualified to discharge such duties. We welcomed the introduction of such a clause, as showing that Parliament admitted the principle that an architect should be qualified for his work. At the same time, however, we gave an indication of the difficulty which the Local Government Board would experience in deciding upon the qualification of architects when they are not by law required to be registered; we also pointed out that for the time being the clause created an anomalous state of affairs, in so far as a Government Department was called upon to express an opinion on an architect's qualifications to build dwellings for the working classes. The difficulty seems to have been sufficient to have led the Local Government Board to juggle with the clauses in question, and there is now considerable agitation in Ireland against the neglect of the principle which had been agreed to—namely, that only architects of ability were to be employed. The council of the Royal Institute of the Architects of Ireland have made public the correspondence which has passed between themselves and the Local Government Board. The Irish Institute consider that the clause in the regulations referring to payment should define a sliding scale with a maximum of 5 per cent. and a minimum of 2½ per cent. (depending on circumstances), with expenses in addition; and they expressed the opinion that the minimum fee of 2½ per cent. should only apply to exceptional cases—such, for instance, as when large numbers of cottages are built in close proximity to one another. They contend, further, that two years' experience on works is insufficient qualification, and suggest that three years' experience in an architect's office should be required instead. The correspondence began in September last. On February 26th the Local Government Board wrote that no useful purpose would be served by receiving a deputation. The Institute replied regretting the decision and repeating their objection to the rate of remuneration. The Local Government Board declined to reopen the matter. The hon. secretary of the Institute now refers to the statement of the Chief Secretary in the House of Commons that "many highly qualified architects had applied to rural district councils for employment at less than the maximum fee fixed by the Board." He states that his council have had an exhaustive search made throughout all the newspaper reports of applications for posts as architects under the regulations of the Local Government Board and have failed to find that any members of the Institute have applied at less than the maximum fee fixed by the Board. Further, the council desire to point out that many if not most of the applicants are totally unqualified to act as architects, several of those appointed by the district councils having even been objected to by the Local Government Board as unfit under the exceedingly wide qualifications in the regulations under the Act, while in other cases the competition for the post proved abortive, there being only one applicant. The secretary states that the inevitable result of fixing such very low fees is to render it impossible for an architect of any standing to apply for such employment, and, consequently, inferior men are appointed, with results highly detrimental to the public interest.

Beverley Minster: a Protest. A protest has been made by the Art Committee of the Royal Institute of British Architects against the setting-up of certain new statues and other restoration work on the west front of Beverley Minster (described by Rickman as one of the finest examples of Perpendicular architecture in the Kingdom). The present vicar (the Rev. Canon Nolloth) appears to be the prime-mover in the matter, he having undertaken the raising of funds for filling in the niches of the western towers and north porch. The work was commenced about ten years ago, at which time there was only one statue on the exterior. Up to the present about seventy statues have been carved by a Mr. Smith (formerly of Messrs. Farmer and Brindley), and most of these are now in position, the remainder being in the sculptor's studio in the stoneyard of the minster. In addition, one or two of the canopies of the niches immediately beneath the large west window have been "renewed," having become very much decayed. We are assured that the "restoration" will be confined to preserving the original designs in minor matters of this kind. Restorers have always been very plausible: all the more reason, therefore, that they should be watched.

CHAPEL OF ST. HUGH, BISHOP'S HOSTEL, LINCOLN.

The new chapel for the Theological College at the Bishop's Hostel, Lincoln, illustrated on this page, was dedicated on April 25th by the Bishop of Lincoln. The chapel has been designed in the 14th-century Decorated style by Mr. Temple Moore, and the work has been carried out by Messrs. Fisher Brothers, of Mansfield. The dimensions are 56ft. by 26ft., exclusive of the sacristy, which forms a lean-to aisle on the north side, 40ft. by 10ft. The outer walls are faced with 2in. Loughborough sand bricks, with Weldon stone dressings. The roof is covered with hand-made Newcastle red tiles. A conspicuous feature is the large and beautiful east window which overlooks Steep Hill—the narrow and precipitous street so familiar to visitors to the cathedral: this window has been filled with painted glass, representing the Crucifixion and various types of the Sacred Ministry, the work having been designed and executed by Mr. H. Victor Milner of Hampstead, who has also acted with Mr. Moore in the decoration of the chapel generally. On the south side facing the garden are three 5-light windows of varied tracery, but on the north side no windows have been placed, the close proximity of the street rendering this arrangement necessary to ensure quiet. The site of the building is to the east of the Bishop's Hostel, with which it is connected by a covered passage and flight of steps leading down to the west door, over which is a Calvary (carved at Ober-Ammergau); this door opens into the ante-chapel, which is separated from the rest of the building by an oak screen, and over this is the organ gallery. Immediately beyond the screen are the clergy stalls and seats for 40 students. As far as the seats extend the walls are lined with panelling 8 feet high, which, like the rest of the woodwork, is of English oak. The blank space on the north wall is broken by three arched recesses. A passage runs through the piers of the windows and arches, serving to carry the heating pipes out of sight, and at the same time having a light and pleasing appearance. As with most college chapels, there is no distinct chancel: the barrel roof, which has been decorated, is at the same level throughout, 30 feet from the floor. On the south side of the sanctuary are sedilia, with small windows above them. The altar, which is 10 feet long, is raised only three steps above the level of the floor, and, with the retable, reaches to within 3ft. 6ins. of the sill of the east window. The altar cross and candlesticks are in beaten brass of fine workmanship, and, like the rest of the fittings, have been designed by the architect. The sacristy (30ft. by 8ft.), on the north side, is reached from the west end, where the stairs lead up to the organ gallery, and another door at the eastern end opens into the sanctuary. The entire building is the private gift of the present Warden of the Bishop's Hostel, the Rev. Canon Du Buisson.



THE NEW CHAPEL OF ST. HUGH AT THE BISHOP'S HOSTEL, LINCOLN.
TEMPLE MOORE, ARCHITECT.

Views and Reviews.

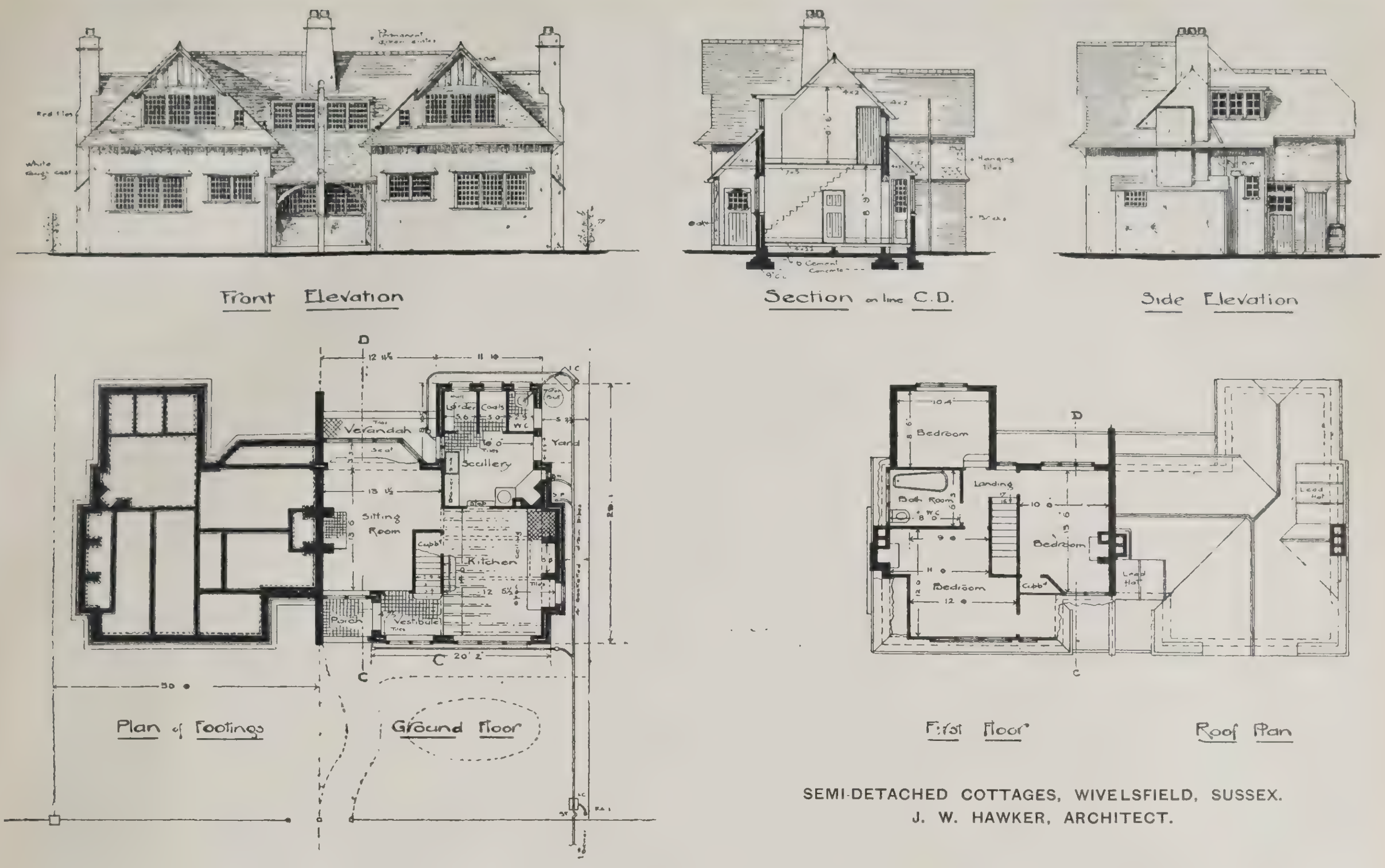
The Principles of Architectural Design.

The author of this book, in one of his earlier chapters, commends the art of leaving out. It would have been a great gain if Mr. Marks had followed this excellent advice himself, and left out the illustrations which disfigure his volume from cover to cover. The author has nothing much to say about the principles of architectural design which is particularly worth the reading; platitudes and trite observations are the groundwork of his book, and the whole treatment is very casual and uninspiring. The subject of architectural design is one about which there would necessarily be a good deal of generalisation. With a writer like Ruskin we could go through chapter after chapter on the elucidation of the principles, charmed at least by the power of his expression, if not in accord with the tenets proclaimed, but Mr. Marks is no stylist, and his manner of expression is commonplace. Moreover, he has an unfortunate facility of introducing Latin, Greek, French and other foreign terms in a way which gives one the impression that the author is endeavouring to display his own erudite knowledge, rather than particularly happy in the selection of words which the English language does not suitably compass. Throughout the volume it would be possible to take up issues with the author, but, frankly, the book is not worth the trouble. The illustrations are crude examples of pen-and-ink sketching—or scratching—and many of them are so small (some no more than ½ in. high!) that they become ludicrous as well as futile. Moreover, we are at a loss to understand why many of the illustrations have been included at all, for they certainly are not commendable as examples of architectural design, and Mr. Marks's own efforts in this direction are most lamentable.

"The Principles of Architectural Design," by Percy L. Marks. London: Swan Sonnenschein & Co., Ltd, 26, High Street, Bloomsbury, price 10/6 nett.

A Book on Libraries.

On former occasions we have noted that certain books dealing with some special classes of buildings were still waiting to be written. Within the last few years the deficiency has been made good in some respects, and in the present volume Mr. Champneys has endeavoured to bring together in volume form the information appurtenant to the planning, design and construction of modern public libraries in this country. We are not aware that the author has had any special experience in the design and execution of such buildings, but he has had the invaluable assistance of his father, Mr. Basil Champneys, in the preparation of this book, and he also expresses his indebtedness to Mr. Duff Brown, and to other gentlemen having special knowledge of the subject. The information as presented is very readable, and is of direct practical interest and use, both to architects and librarians. The only comment we have to make is that perhaps the planning itself does not receive quite the attention it deserves, and, moreover, the illustrations are not sufficiently comprehensive. From the illustrations in this volume, indeed, we might get the impression that there were only three or four important libraries in this country: for instance, in chapter 7, dealing with the lending department, we see photographs of the Kettering Public Library and the



SEMI-DETACHED COTTAGES, WIVELSFIELD, SUSSEX.
J. W. HAWKER, ARCHITECT.

These cottages are designed with a view of supplying an ever-increasing demand for small houses to suit the convenience of families desirous of leading a simple country life. The accommodation of each house comprises on the ground floor a kitchen and living-room combined 14ft. by 11ft., sitting-room, scullery, coals, larder and w.c.; with three bedrooms, linen cupboard, bath room and w.c. on the first floor. The front and side elevations are covered with white rough-cast and the roofs with "permanent" green slates, the gables being tile-hung and finished with oak half-timbering. Drains are connected with the main sewer in the road, and water, gas and electric light are supplied from Burgess Hill. Rainwater is stored for washing. The cottages are close to Wivelsfield Station, on the L.B. & S.C.R., and are set back 20ft. from the main road. At the rear is a good garden, with orchard. The architect is Mr. James W. Hawker, of 9, North Street, Brighton, and the builder Mr. W. Oram, of Burgess Hill.

Kingston Public Library; then in the next chapter, dealing with reading rooms, we see these departments in the same two libraries again; and the same thing occurs in the next chapter, dealing with the reference department; and so on, with the addition of the Wakefield library and Mr. Hare's Islington libraries, and some American examples. We think the author would do well to get some photographs of other libraries in this country, so as to give the book a more comprehensive appearance. As regards the American libraries, the author admits that even in those countries which have public libraries with a similar legal basis to our own, the detailed constitutions differ in so many particulars from those which obtain here "that it is impossible to treat them as in any way homogeneous, though some few foreign examples, more especially of American libraries, which may be useful to British architects and librarians are adduced." In view of that statement it would have been more logical to omit some of the American illustrations and to have given up the space to examples in this country. The author has wisely not attempted any historical survey of the subject, but has confined himself to the modern library, its planning and its fitments. The fitments have, of course, considerable governing influence on the planning, and Mr. Champneys has on that account considered it advisable to deal with them first. As he says, arguments might be employed in favour of the reverse order of sequence, but the matter seems to us of no particular importance. As a whole the book is to be recommended. The subject is an important one and a difficult one. Mr. Champneys has produced a very creditable volume, which, in future editions, might be extended in the manner suggested and made a thoroughly good treatise. As regards the production of the book, being one of Mr. Batsford's, we need hardly say it is produced in the best possible manner, the paper being excellent, the type large and clear, and the illustrations well printed. At the end of the book are appendices comprising the Acts relating to public libraries.

"Public Libraries," by Amian L. Champneys. London: B. T. Batsford, 94, High Holborn, price 12/6 nett.

The Welsh Cathedrals.

"Bell's Cathedral Series" has been a very useful collection of handbooks written in an interesting way by different authorities, well illustrated, and furnishing an abundance of information which it is difficult to find elsewhere. To this series are now added the handbooks before us—namely, those dealing with Llandaff and Bangor Cathedrals. These come under the section devoted to the Welsh cathedrals, the remaining volume on St. David's being by Mr. Philip A. Robson, A.R.I.B.A. Neither Llandaff nor Bangor Cathedral is particularly interesting, but, of course, they had to be done in order to make the series complete. In both volumes the order of the preceding handbooks in the series has been followed—that is, to give first a history of the building, and then to deal with the exterior, the interior and the several separate parts of the structure, the monuments, &c. The former volumes in the series have been much appreciated, and doubtless these two additions will be welcomed by many who are interested in these two cathedrals.

"The Cathedral Church of Llandaff," by E. C. Morgan Willmott, A.R.I.B.A. London: George Bell & Sons, price 1/6 nett.

"The Cathedral Church of Bangor," by Pearce B. Ironside-Bax. London: George Bell & Sons, price 1/6 nett.

Romsey Abbey.

The author of this book, which is the latest of the series uniform with "Bell's Cathedral Series," has only quite recently died. He was rector of Turnworth, Dorset, and a man with a wide knowledge of architectural history. He was the author of the volumes on "Amiens," "Rouen," "Wimborne and Christchurch," and other volumes in this series. The present volume on Romsey Abbey is very creditably produced, and the facts are presented in a readable manner. Photographic illustrations are interspersed through the book, these having been taken by the author himself at various times during the last twenty years, he having been a frequent visitor to the Abbey, and having made himself familiar with all its details by personal examination of the fabric and close enquiry into its history.

"Romsey Abbey," by the late Rev. T. Perkins. London: George Bell & Sons, price 1/6 nett.

Another New Edition.

This is the third edition of Fletcher's "Architectural Hygiene." The title was never, perhaps, a happy one, but, having once been chosen, it is, of course, inadvisable to alter it now. The book deals with sanitary construction, house drainage, water supply, ventilation, heating, lighting, &c., and the information is presented in a handy form, illustrations being very freely dispersed throughout the book.

"Architectural Hygiene, or Sanitary Science as applied to Buildings," by Banister F. Fletcher, F.R.I.B.A., F.S.I., and H. Phillips Fletcher, F.R.I.B.A., F.S.I.: 3rd edition. London: Whittaker & Co, 2, White Hart Street, Paternoster Square, E.C., price 5s. nett.

Trade and Craft.

"Anaglypta" and "Salamander."

The 1907 catalogue of "Anaglypta" and "Salamander" has reached us from Messrs. Wall Paper Manufacturers, Ltd. (Anaglypta branch), Darwen; London warehouse, 71, Southampton Row, W.C. It follows the form of preceding issues, with a supplementary portion at the front giving this year's new designs, the remainder of the book showing all the designs previously issued, which, with a few exceptions, are still current. A special feature of most of the designs issued this year—particularly those in high relief—is that they can be built up and adapted to spaces of almost any size, so as to give a complete decoration. This is a most commendable feature, and the manner of illustrating some of the designs with photographs of completed ceilings is excellent as showing the actual appearance of the work as carried out. "Anaglypta" and "Salamander" are far too well known to call for any extended notice. They are most admirable materials, and the vast number of designs in which they are obtainable enables every requirement to be met. The designs throughout are well chosen, and eminently adapted to the material, the friezes especially comprising examples of very beautiful treatment. Among the new designs for friezes just issued one especially calls for comment; it includes panels with child figures representing Earth, Air, Fire and Water, treated as panels and arranged in the frieze with leaf-work panels between. It is perhaps well to add that for any of the high-relief or panel decorations the firm are always pleased to prepare (free of charge) a scale plan showing the application of the work.

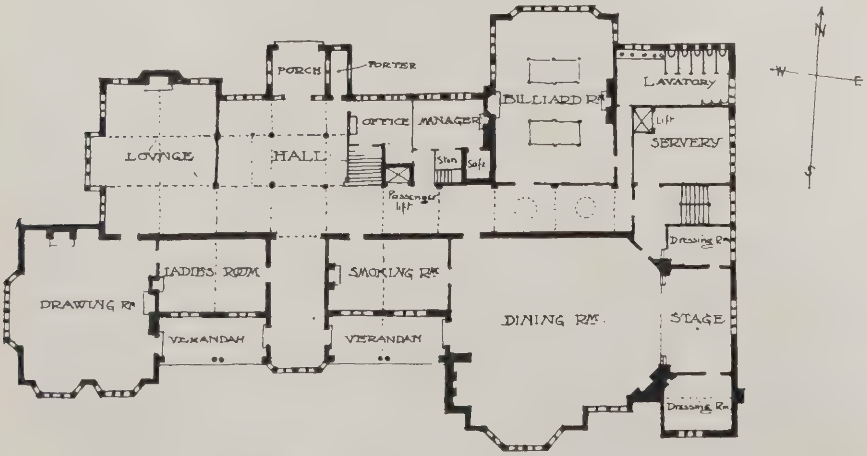
"Durolite."

We understand that the business hitherto carried on by Messrs. Durolite, Ltd., has been purchased, and will be carried on, by the Durolite Co., at 35, King William Street, E.C., and at St. Helen's, Lancashire. The manufactory at St. Helen's will be under the same management as hitherto, thus ensuring the established merits of "Durolite." The Durolite Co. claim that their material has been proved to be completely satisfactory in its results, its durability beyond question, and its artistic merits gaining for it a unique position as a sanitary wall tiling. During the last four years many thousand yards of "Durolite" have been fixed in London and the provinces under a repairing guarantee, and not a single tile has been replaced under such guarantee. "Durolite" is manufactured in a number of delicate self-tints, which, in combination with the marbles, granites and carved designs—produced so wonderfully true to the original by a valuable process—easily lend themselves to wall schemes of a permanent and artistic character.

Our Plate

Hotel at Camberley.

The accompanying plan shows the arrangement of this hotel on the ground floor, from which it will be seen that it is a residential hotel in every sense of the word. The instructions given to the architects (Messrs. H. R. and B. A. Poulter, of Camberley, Surrey) were "to plan a hotel as near as possible like a large country house," as the proprietors do not intend seeking any commercial or bar trade. In the basement are kitchen, sculleries, large stores and staff living and sleeping accommodation. Upstairs on two floors are several suites of rooms, mostly comprising sitting-room, two bedrooms and bathroom, these varying in size and style according to the position on plan. Altogether there are about 40 rooms, but additional wings have been carefully planned in case of future additions being required. These rooms can be used singly. In general design the rooms have been kept quite plain, with white walls and oak joinery. A feature has been made with a good entrance hall and staircase. A passenger lift and service lift are provided. The fireplaces are specially designed in brick. Externally, the walls are brick, whitened, with stone dressings and red tiles sparingly used, as shown. The roofs are to be covered with local sand-faced dark-red tiles, and the chimneys are to be in local dark sand-faced bricks, pointed white. Lead glazing is to be used throughout in the windows, fixed direct to the stonework except where opening, when iron casements are fitted. The main rooms face south, directly overlooking a large lawn.



GROUND PLAN.

PROPOSED HOTEL AT CAMBERLEY, SURREY. H. R. AND B. A. POULTER, ARCHITECTS.

Correspondence.

Sunderland Libraries Competition.

To the Editor of THE BUILDERS' JOURNAL.

Sir,—Having seen notices in your Journal respecting this competition, and the unusual fact of one firm being placed first and second for each building, it is only fair to the other competitors to draw attention to the facts of the case. (1) The conditions clearly stated that the drawings "must be to ⅛in. scale." The successful competitors, who submitted six sets (I believe), sent in drawings to ¼in. scale. The sets were thus clearly distinctive as being from the same source. (2) They, of course, looked more imposing drawings, four times the size of the other sets. (3) The assessor, instead of disqualifying the authors for breaking the conditions, and thus gaining an unfair advantage over the other competitors, showed his appreciation of their "industry" by placing them first and second, and in addition added insult to injury by stating in his report that the other competitors had "shirked" detail.—Yours truly

OBSERVER.

Bishop Auckland School Competition.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—As a competitor in the above I have naturally been interested in this correspondence. I must say that most of the objections raised against the selected design are not of a very serious nature, with the exception, perhaps, of the arrangement of cloakrooms and w.c.'s, which, to say the least, are certainly not up-to-date.

Considering the number of objections raised, I am surprised to find that nobody has called attention to what appears to me to be a fatal mistake—namely, the very small space between the building and the adjoining land on the south side. If at some future time the adjoining owners build up to their boundary I should imagine the light and sun on the whole of this front would be very considerably interfered with. It would be interesting to hear the opinion of other competitors on this point, as I prepared a plan very much on the lines of the selected one, but discarded it for the above reason. Of course, it is one of those points which have to be risked with the average assessor. In Mr. Reynolds's case it came off. Good luck to him! I can only say that if this building comes up in any way to the high standard of his Soane medallion design the Bishop Auckland Education Authority will not regret the selection.—Yours truly,

LONDON. M. E.

An Arts and Crafts Exhibition is being held until June 20th at the Builders' Exchange, Birmingham, under the auspices of the Crafts Club, of which Viscount Morpeth is president. Among the exhibits are details of Indian architecture, in six folios.

The Waygood Lift at the Building Trades' Exhibition.—During the Building Trades' Exhibition at Olympia the electric passenger lift erected by Messrs. R. Waygood & Co., Ltd., carried more than 25,000 passengers up to the gallery. The lift was working twelve hours a day for twelve days, with a consumption of 264 B.T. units, which, calculated at 1d. per unit (as charged by many electric supply companies) would bring the cost out at 22s.

Enquiries Answered.

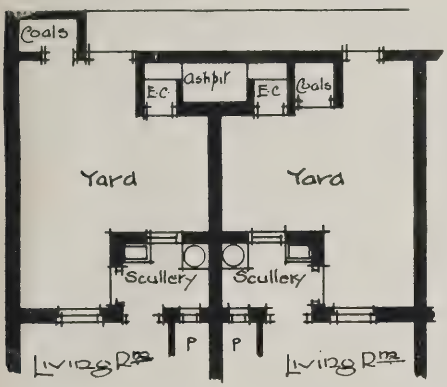
The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Coalhouses.

MIDDLESBROUGH.—X. writes: "A client of mine erected four houses. The plans were passed showing the position of ashpits, earth-closets, and coalhouses, but the local surveyor would not allow the coalhouses to be built because there was nothing in the by-laws about them: consequently they were not erected. The plans were all in order and complied with the by-laws. Now, my client has erected two other houses, but has added the two small sculleries shown on plan; he has also erected the coalhouses, plans of which were duly forwarded. The surveyor has reported this, and the local authorities are taking action for breach of by-laws. The plans in every way comply with their by-laws, including the yard areas, which are 182 ft. super and 170 ft. super respectively. Can the local authorities make my client take down the coalhouses."



Apparently the difficulty now does not consist in the building of anything contrary to the by-laws, but in building at all! and this because the plans have never received the sanction of the local authority. You are evidently in the wrong in this respect, but I do not think that so violent a remedy as "pulling down" will be sanctioned by the magistrates. The surveyor is of course wrong in stating that a coalhouse cannot be built because the by-laws are silent upon the subject. Cannot you adjust the matter by conference with the council's surveyor? It is a very trivial matter. F. S. I.

R.I.B.A. Examinations.

MEHSANA (INDIA).—P. S. V. writes: "Please give names of books on Classic ornament, and the characteristic mouldings and ornaments of different periods, and styles of architecture. If possible, please send me a list of books of use in preparing for the R.I.B.A. examinations. Are these examinations held in India?"

You would do well to obtain a copy of the R.I.B.A. Kalendar from the secretary of the Institute, as it contains a list of books recommended to students, past examination papers, advice to intending competitors in these examinations, as well as a quantity of information useful to an architect. The list given is rather a long one, and contains many very valuable books which you would probably not be prepared to purchase, but the following list will be found to cover the ground of the examinations fairly well:—R. Phenè Spiers' "The Orders"; Myer's "Handbook of Architectural Ornament"; Banister Fletcher's "History of Architecture"; Mitchell's "Building Construction: Elementary and Advanced"; Middleton's "Stresses and Thrusts"; Sparton's "Geometry"; Bond's "Gothic Architecture in England." (These books can be obtained from our offices.) You should gain some knowledge of English materials and methods of construction, but due allowance is always made by the examiners for men used to foreign materials and methods. Examinations are not held in India, so that if you intend to sit you must come to England. H. Y. M.

INTERMEDIATE writes: "What books do you recommend for the R.I.B.A. intermediate examination? Also, do you think 'correspondence by post' is as good as individual tuition?"

A list of books recommended for the R.I.B.A. examinations is given in the Institute Kalendar, price 2s. 6d., from the secretary, No. 9, Conduit Street, London, W. Tuition by post is not nearly so good as personal tuition; at the same time, it is satisfactory, and much superior to personal tuition by an incompetent teacher. It has the advantage of encouraging the student to study hard, and, after all, the chief value obtained from a course of study depends upon the student himself.

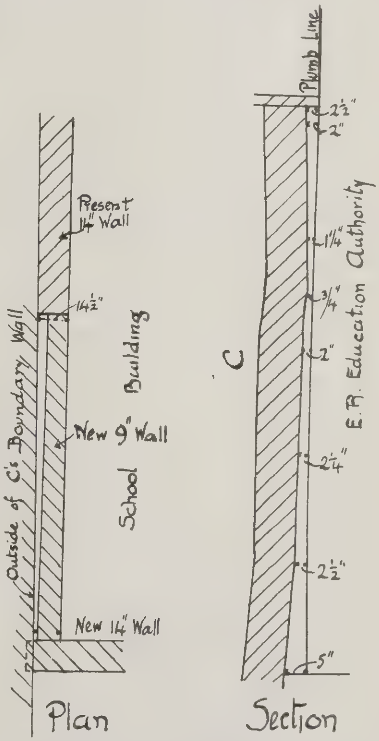
Walking Tour in Normandy.

MARYPORT.—M. writes: "A ten or twelve days' walking tour is contemplated for the summer in France, commencing at Cherbourg and ending at Granville, comprising any of the country between these two places, as far east as Carentan, St. Lo, and Vire, and as far south as Avranches and Flortain, by one accustomed to walking and anxious to get off the beaten track. What special points of architectural interest should be noted, the aim being to enjoy some of the lesser-known objects of interest? What books should be read preparatory to taking such a journey? What maps should be obtained, and where?"

You cannot do better than consult "Murray's Guide to Travellers in France," which can be seen in practically any library. This book points out all the places of interest both on and off the "beaten track," gives historical notes, and maps, as well as advice about hotels, &c. You mention Avranches as the southern limit of your tour, but there is very little of architectural interest here, the Norman cathedral which once adorned it having been demolished to save it from falling; the town, however, is very beautiful, and is delightfully situated. While in this part of Normandy it would be well worth your while to pay a visit to Dol, a very quaint old town with a fine cathedral and many old houses worth sketching; and before going back to Granville you should make Mont. St. Michel the culminating point of your tour. This is one of the most picturesque places in France. It contains a magnificent abbey, portions of which date from the ninth to the fifteenth century, as well as numbers of picturesque houses. The island of Mont. St. Michel is accessible at any time of the day, as a causeway built by the railway authorities connects it with the mainland. The extent of the tour as suggested will be about 100 miles, and it is doubtful whether you will be able to cover this distance all on foot if you spend much time in sightseeing and sketching. The railway, however, follows the general direction of your tour, and will be of assistance if you find you are not making such rapid progress as anticipated. You will do well to take a map and the few necessary pages from a Continental "Bradshaw." An excellent book upon France, copiously illustrated with photographs and coloured plates, is Bressard's "Géographie Pittoresque et Monumentale de la France." "Murray's Guide-book to France," Part I., contains many maps of Normandy and Brittany, and plans of the more important buildings. The best maps you can obtain are the French Government survey maps, to be obtained from Stanford's, 12, 13 and 14, Long Acre, London, in single sheets, at the price of 1s. each. These sheets can be obtained mounted upon canvas, according to your own instructions, at an extra charge. H. Y. M.

Adjoining Owners and Boundary Wall.

HULL.—K. writes: "The accompanying illustration shows a plan and section of a boundary wall. This wall is about 40 years old, and has a stone coping projecting 2½ins. The adjoining owners have commenced to build a new wall (as shown) at the foot of my client's wall, where a plumb line from the coping is 5ins. over, as they say, on their land; they have built about 3ft., and in so doing have had to cut into the wall, so that their wall will be plumb. Have they a right to do this? By so doing they will weaken our wall. When they build above the wall will they be entitled to come over the top of it? Can an injunction be obtained to restrain them from cutting the wall?"



Apparently your client's wall has so leaned over as to form an encroachment upon your neighbour's land; though as you do not show the footings one cannot be quite sure of this. I do not think an injunction would be of any real worth to your client (as it would cost more than its value, even if obtained), and I advise a friendly settlement with the adjoining owners. Why not ask them to build a 14-in. wall and remove yours entirely? F. S. I.

Chancel Roof Truss.

NEWCASTLE-ON-TYNE.—G. writes: "I propose roofing a new chancel to an existing church, as shown by sketch (redrawn). Will Professor Henry Adams kindly give dimensions and state whether tie-rods are required? There will be no principals, but each spar will be framed so, and at 16-in. centres. It is afterwards proposed to form panels by ribs planted upon the inside boarding over a spar."

The design submitted by this correspondent, shown in Fig. 1, is very poor. Taking it as equivalent to a collar-beam roof, as in frame diagram, Fig. 2, the loads will be as shown, and the reactions may be obtained by means of Fig. 3. As the stress diagram cannot be completed with the ordinary loads, owing to the bending moments incurred, virtual forces, as shown by dotted lines in Fig. 4, must be added, being calculated by taking moments about the junction of the principal rafter and collar from the reactions—namely, 840lbs. × its leverage 5·6—175 lbs. × its leverage 7·2 = virtual force × its leverage 9·5. Therefore the virtual force $= \frac{840\times5{\cdot}6-175\times7{\cdot}2}{9{\cdot}5} =$ 362lbs. Then, the collar dividing the rafter into lengths of 9·5ft. and 7ft., the virtual force at the upper end will be $362\times\frac{9{\cdot}5}{7}=491$ lbs., and the equilibrant at the junction of the collar will be 362×491 =853lbs. The other side will be worked in a similar manner. The stress diagram, Fig. 5, may then be completed, and the bending moment diagram added to Fig. 4. The weakest part of the truss will be through A in Fig. 1, and the bending moment at this point will be 3,084 lbs.-ft. =331 cwt.-ins. Then $zc=331$ or $\frac{bd^2}{6}\times 4$ =331, whence $bd^2=\frac{331\times6}{4}=496{\cdot}5$, which is given by a 10in. by 5in. beam. If this depth cannot be allowed at the part considered, the scantlings may be reduced and buttresses added to the walls, as it would be unsightly to put tie-rods or wires to every pair of rafters.

HENRY ADAMS.

Marble Mosaic Paving.

WOLVERLEY.—H. E. writes: "Kindly give proportions for Venetian marble mosaic (terrazzo). Is it usual to add any sand with the cement?"

EQUIP writes: "Please name some firms who supply the various colours of spar or marble chippings used by Italians when laying mosaic pavement. Also state whether any chemical is used to assist in the polishing of this pavement."

Venetian marble mosaic or terrazzo is made up of pieces of marble of varying sizes passing a ¼-in. to ⅝-in. mesh, laid to a depth of ½in. The concrete basis is either pure Portland cement or, preferably, 1 of sand to 1 of cement, the layer being about ¾in. thick. Under this may be a coarser concrete, proportioned 5 to 1, or more. We are not aware of any chemical being used to assist in polishing terrazzo pavements.

Rough-Cast.

QUEREST writes: "Which is the cheapest way to apply rough-cast to the wall of a small cottage? Would a rough-cast composed of hydraulic lime and screened washed ashes be satisfactory, and could this be applied in one coat only?"

We do not think a rough-cast composed of the materials you mention would be satisfactory. The hydraulic lime would need to be a very good one to be satisfactory, and screened washed ashes would be dirty in colour and of no great assistance to the strength of the lime. We would rather recommend for a cheap rough-cast 1 of Portland cement to 2 of sand, applied in one coat, finished with a trowel. This, of course, would not have a rough surface, but it would be more weather-resisting, and we venture to think it would be of thoroughly satisfactory appearance.

Cycle Works.

BIRMINGHAM.—F. A. K. writes: "I should be glad if you would refer me to any plan showing the lay-out of a cycle works, or similar engineering works."

We do not know of any plan showing the lay-out of a cycle works, but you will perhaps find it of service to refer to the article by Prof. Robert H. Smith on "The Planning of Machine Shops" in "Specification No. 7" (obtainable from our offices, price 2s. 6d., or 3s. 3d. post free).

A Waterproof Composition.

LONDON.—O. writes: "Who is the maker of McGuire's patent waterproof composition for stopping leaks in roofs made of iron, zinc, wood or masonry?"

Enquiries have been made from Mr. John Macquire, a well-known slater, but the writer is unable to learn anything about the composition named. Mr. H. R. Justice, of 55 and 56, Chancery Lane, E.C., has a "Flexible Compound" which might possibly answer the purpose, but a more likely material would be "Plastine," a flexible putty made by Messrs. Carson & Sons, of Grove Works, Battersea, S.W.

Non-Flammable Wood.

BREDBURY.—C. writes: "Please give me some information, or tell me where I could get information, about the cost or the manner of preparing non-flammable or fireproof timber."

Apply to the Fire-Resisting Corporation, Ltd., Townmead Road, Fulham, S.W.

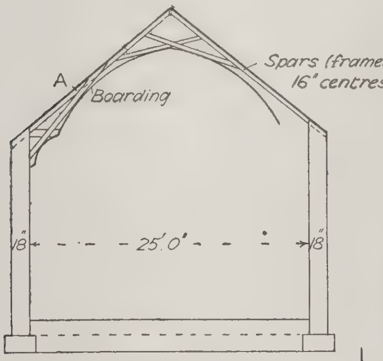


Fig. 1

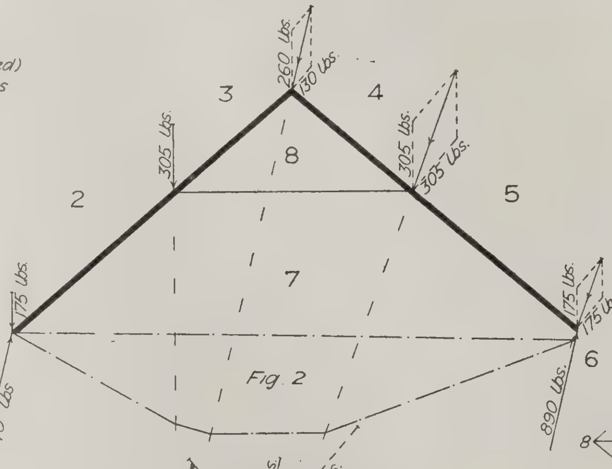


Fig. 2

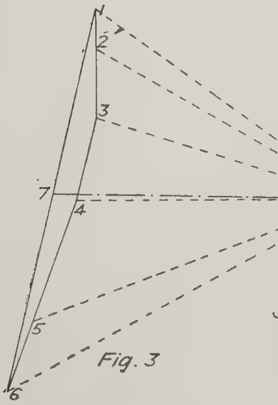


Fig. 3

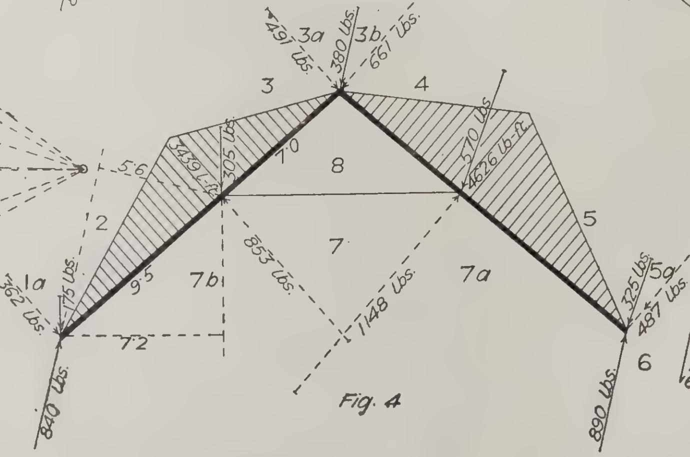


Fig. 4

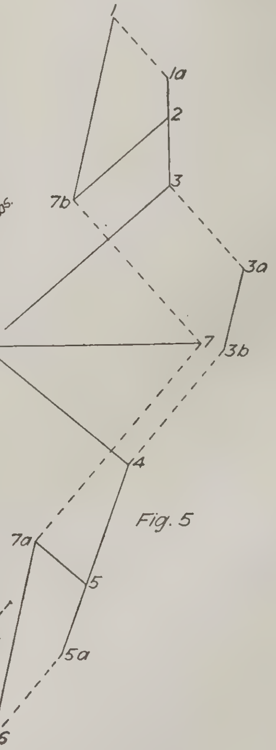


Fig. 5

CHANCEL ROOF TRUSS.

COMPETITION FOR Y.M.C.A. BUILDING PONTYPRIDD.

Summary of Conditions.

We give below a summary of the chief conditions of the competition for the new building proposed to be erected on a site at the corner of Taff Street and Crossbrook Street, Pontypridd, for the Young Men's Christian Association. This summary will enable architects to form an opinion as to whether or not they will enter for the competition. Those who wish to do so can obtain the full conditions from the secretary of the Buildings Committee, Mr. George W. Rankin, "Bronheulog," Church Place, Penarth.

The competition is open to all practising architects.

Designs will be adjudicated by an assessor appointed by the president of the R.I.B.A., whose decision will be final and binding.

Premiums of £25, £10 and £5 will be awarded to the designs placed first, second and third respectively, which designs will become the absolute property of the committee. "In the event of any of the plans and designs not being of sufficient merit, the adjudicator may withhold the awards."

The committee do not bind themselves to employ any of the architects who have been awarded a premium to carry out the work, but in the event of their doing so the premium awarded is to merge in the amount of the commission, which will be at the rate of 5 per cent. on the nett cost of the building, exclusive of quantity surveyor's fees, clerk of the works' salary, lithography and printing; such commission is to cover any reasonable alterations in the designs and plans which the committee may require.

(Site plan furnished, with levels: also view of buildings at present on the site.)

The new building, in regard to height and other respects, must be designed with due regard to rights of light and air, and any other easements of adjoining owners and occupiers, and in accordance with the building and other Acts and regulations affecting buildings in the district of Pontypridd.

The style of architecture and the materials to be employed are left to the discretion of the competitors. It should, however, be borne in mind that the building will be chiefly used by those of the industrial class, and that the promoters desire that the elevations be of a plain character, except that a special feature be made of the main entrance on Taff Street. The expenditure should be mainly in enhancing the appearance of the interior and ensuring the general utility of the building. The use of local stone should be considered.

Designs not illustrated by the drawings specified, or not in any other way conforming with these instructions and conditions, will be excluded from the competition, and no other drawings or photographs will be received. Any competitor giving any clue of his identity to the committee, adjudicator, or public, will be disqualified.

An envelope will be supplied to each competitor by the committee, to contain his name and address, to be sent in sealed with the drawings, &c. No handwriting, signature, or mark of any kind by which a competitor may be identified, is to appear anywhere except within the envelope supplied. The envelope must also contain a declaration by the competitor that the design is his own personal work, and that the drawings have been prepared under his own supervision.

Drawings must be accompanied by specification and estimate of cost. The cubical contents must be given in detail with the estimate, and the cost per cub. ft. attached.

The total cost of the buildings, including pulling down of old buildings, and clearing site, drainage, heating, ventilation, water, lighting, and sanitary appliances, but exclusive of architect's and quantity surveyor's fees, must not exceed £6,000.

If it should be found on opening the tenders for the execution of the building that it cannot be erected for a sum within 5 per cent. of the amount originally estimated, the committee, if they think fit, may reject the design, and the architect shall not be entitled to any claim for commission, premium or otherwise.

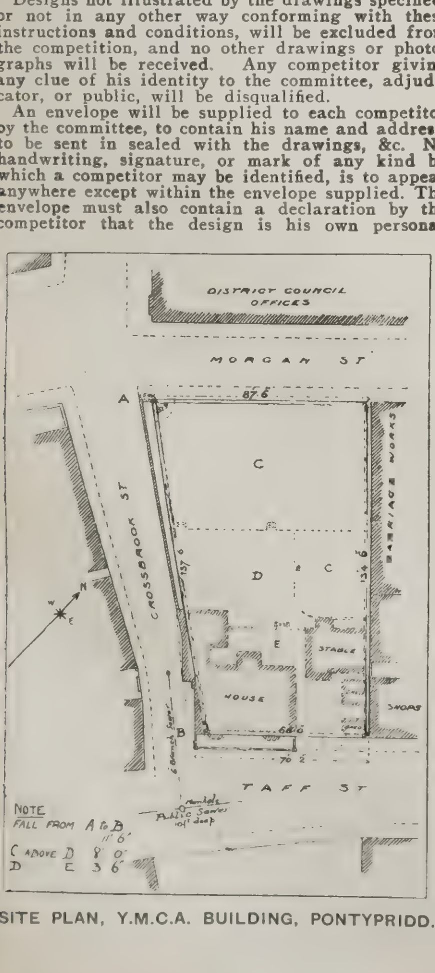
Designs, other than those for which premiums are awarded, will be returned free of charge to their authors within three months after the award has been made.

Designs to be sent in by July 1st next; enquiries by May 31st.

Drawings required: A plan of each floor, three elevations and two sections (or more if required to illustrate any particular feature) to ⅛th scale; block plan to $\frac{1}{16}$th scale; detail or part elevation facing Taff Street to ½in. scale; perspective from corner of Taff Street and Crossbrook Street.

As it is possible that the promoters may not desire to build the whole scheme at one time, a tracing is to be sent showing which portion or portions can best be omitted without detriment to the general effect.

The accommodation required includes a spacious reception or social hall, secretary's office, café, two shops, small hall, swimming bath, miniature rifle range, reference library, committee rooms, four classrooms, ladies' room, suite of rooms for boys' department, boarding department (with 20 bedrooms, dining-room, kitchen, &c.), cycle accommodation, dark-room, lift, &c.



SITE PLAN, Y.M.C.A. BUILDING, PONTYPRIDD.

WEYMOUTH PAVILION.

We give below a summary of the particulars issued in connection with the competition for the pavilion to be erected at Weymouth. The attention of readers has already been directed to the clause requiring quantities and a bona-fide tender to be submitted with designs. This is a very objectionable clause, and on that account the competition deserves to be boycotted. It is suggested that if architects from different parts of the country wrote to the Plymouth Corporation protesting against the clause, the conditions might be amended. A correspondent writes :—"For the council or committee to receive, say, 500 letters would be a more effective way of knocking the thing on the head than any epistle from a society of whose existence, in all probability, they were up to that time unaware. There is undoubtedly strength in numbers."

The building is to contain an assembly room with balconies to seat 1,100 persons, and to have a promenade around the end and two sides. A stage is to be provided at least 27ft. depth, with all appointments necessary for first-class variety and dramatic entertainments; provision also for orchestra, four dressing-rooms, and necessary conveniences for artists, &c. The building is also to contain ladies' and gentlemen's lavatories, with pay office, vestibule, buffet, manager's room and tea room (the latter may be placed over the vestibule, buffet, &c.), and also stokehole for heating apparatus. The cost of the building, exclusive of foundations, lighting, seating and heating, is not to exceed £8,000.

"The design to be accompanied with full detail plans, sections, specification, and perspective view, the whole drawn to a scale of 8ft. to 1in., with quantities and bona-fide tender of the cost of the pavilion."

"The sum of one hundred guineas will be awarded for the selected design, on the award of a qualified professional man to be appointed to assist the Corporation."

The selected design will become the property of the Corporation.

Designs to be delivered to the Town Clerk's office on or before July 30th, 1907.

COMPETITION FOR HOUSES FOR THE POOR, KINGSTOWN.

Summary of Conditions.

The following is a summary of the chief conditions of the competition for houses for the very poor to be erected on two sites at Kingstown:—

Houses are to contain not less than two rooms each, to be not less than two storeys high, and each habitation is to be provided with a closet and scullery sink. It is the intention of the Council to let these dwellings at 2s. each per week.

Competitors are to furnish a block plan showing the houses, together with the drains and water systems. Complete plans and specifications are also to be sent.

The quantities of one unit of each class of building proposed to be put up are to be taken out in detail and are to be guaranteed by the competitor or by a quantity surveyor.

A detailed estimate based upon this bill of quantities is to be forwarded.

The Council intend to ask the assessor to examine into the bill of quantities, and to consider the prices at which the items are charged with a view to advising of their reasonableness.

Competitors are to work out a financial statement showing the cost of the buildings and the other works as already mentioned, the annual charge, and the profit or loss forecasted on the undertaking, assuming the properties to be let at the rent mentioned.

A first premium of £100, and a second premium of £20, on the award of the assessor; the premiated plans to become the sole property of the Council.

If none of the drawings are considered by the assessor to comply with the conditions of the competition the above-mentioned premiums will not be awarded.

Plans to be received by the Town Clerk not later than 10 a.m. on July 1 next.

Plans of the sites, with sections and the conditions in full, can be obtained from the Town Clerk for 1s. per set.

It will be seen that in this competition quantities and a detailed estimate are required. The same adverse criticism, therefore, applies to this competition as to that for the Weymouth pavilion.

Notes on Competitions

Pan-American Palace of Peace.

Eight architects in the United States have been invited to compete for the above (the Bureau of American Republics Building), which is to be erected at Washington at a cost of £150,000—the gift of Mr. Carnegie. The award will be announced in July.

Church at Bramhall, Stockport.

The design of Messrs. J. Gibbons & Sons, of Manchester, has been selected (in competition) for a new church to be built at Bramhall, to seat 500 persons.

Riddrie Estate, Glasgow.

The awards in the competition for the lay-out of the Corporation's estate at Riddrie, Glasgow, and the erection thereon of small houses, has at last been announced. Designs were sent in by January 12th last. The Finance Committee have now approved the report of Mr. A. B. Macdonald, the City Engineer, who assessed the plans; 118 sets were submitted. The Committee recommend that the first premium (£75) be awarded to the author of design No. 9; the second premium (£50) to No. 45; and the third premium (£25) to No. 25. In accordance with the terms of the competition, these designs will, on payment of the premiums, become the property of the Corporation. Mr. Macdonald says: "No. 9 provides 612 houses, and the measurers report that the cost of each class of house would be: Three apartments, £275; four apartments, £335; five apartments, £359; or an average of 64·61d. per sq. ft. of floorage area. This design is one of outstanding merit, the block plan being well laid out to suit the contour of the ground. No. 45 provides 532 houses, and the measurers report that the cost of each class of house would be: Three apartments, £310; four apartments, £345; five apartments, £412; or an average of 65·28d. per sq. ft. of floorage area. This design has also a good block plan, though not of equal merit to No. 9. No. 25 provides 501 houses, and the measurers report that the cost of each class of house would be: Three apartments, £300; four apartments, £350; five apartments, £410; or an average of 67·30d. per sq. ft. of floorage area. This design has a good block plan, but the cost of the houses, in proportion to the floorage area, is higher than either No. 9 or No. 45, and the plans of the houses are not quite so satisfactory. The elevations are fairly good. The front wall in each of the three designs is intended to be of brick, rough-cast; the roof of No. 9 to be covered with tiles, and Nos. 45 and 25 with slates."

London County Hall.

In our issue of last week we published the letter from members of the Institute protesting against the conditions of the competition for the London County Hall, in particular against the position of the Council's architect (Mr. W. E. Riley, F.R.I.B.A.) in regard to the selection and execution of the design. Referring to this letter, Mr. Thomas A. Pole, A.R.I.B.A., of London, writes as follows :—" . . . Only 4 members of the council of the R.I.B.A. out of a total of 38, and 7 presidents of Allied Societies out of a total of 18, have signed the protest. Mr. Riley's position as joint or consulting architect, according to the instructions, relates only to internal economy; and who could have this knowledge more than the L.C.C.'s own architect? As to the suggestion that the arrangement is going to prevent a fine architectural building being erected, the best answer is the appointment of Mr. Shaw as one assessor and an additional assessor chosen by the competitors themselves. Further, the list of men who have accepted the invitation to compete is sufficient proof that the profession as a whole is satisfied with the arrangement."

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
June 1	SMALL HOLDINGS, ROSSALL. (Plans and specification.)—Premiums £10 and and £5. Particulars from D. Abercrombie, 25, Cross Street, Manchester, or Secretary, Estate Office, Fleetwood, Lancs. Summary in "Builders' Journal," February 6th.
June 15	ELEMENTARY SCHOOL AT HESWALL (for 300 Children).—Conditions from J. H. Grundy, clerk to Administrative Sub-Committee, District Council Offices, Hoylake,
June 24	REMODELLING OF SMITHFIELD, UTTOXETER (for cattle, sheep, pigs and calves).—Premium £20, for plan, specification and estimate. Particulars from F. S. Hawthorn, clerk, Council Offices, Uttoxeter.
July 1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5, Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth. Summary on preceding page.
July 1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown. Summary in this issue.
July 6	ZION INSTITUTIONAL CHURCH, MANCHESTER.—Limited to Manchester architects. Particulars from J. S. Gibson, 5, Old Bond Street, London, W.
July 30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth. Summary on preceding page.
Aug 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept. 2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept. 11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN. — Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in "Builders' Journal, May 1st.
No date	HYDROPATHIC ESTABLISHMENT AT MACDUFF, BANFF.—Particulars from Town Clerk, Banff.

VENTILATION TESTS.*

By N. W. Hoskins, M. R. San. Inst.

The old standard of purity, as laid down by De Chaumont, is that the air of a room should not contain more than ·02 per cent. of CO_2 (carbonic acid gas—carbon dioxide) in excess of the external atmosphere. This standard is advocated by most authorities, although considered by some to be rather stringent. We cannot overlook the fact that the higher standard of purity for air the more beneficial it is for health.

On an average we breathe at the rate of sixteen respirations a minute, inhaling about 30 cub. ins. at each breath; therefore, $\left(\frac{16 \times 60 \times 30}{1728}\right)$ = 16 cub. ft. of air per hour is exhaled, of which 4 per cent., or ·6 of a cub. ft., is CO_2.

To maintain De Chaumont's standard of purity, each person must be supplied with 3,000 cub. ft. of fresh air per hour, and if the air of a room is completely changed three times in one hour each person should be supplied with 1,000 cub. ft. of air space.

How often is this met with in practice? Dr. Galton says that 1·5 per cent. of CO_2 present in the air will produce headache; as anything below ·1 per cent. appears to have no detrimental effect on health, it would appear that the percentage of permissible impurity might well be raised to ·1 per cent.; this would bring the practice of the engineer more in keeping with the medical theory.

There is no simple and reliable test for determining the amount of organic impurities which may be present in the air. The quantity of carbon dioxide in a given volume of air, however, may be ascertained by several methods, and as this gas bears a constant relation to the amount of organic impurities it is usually taken as an indicator.

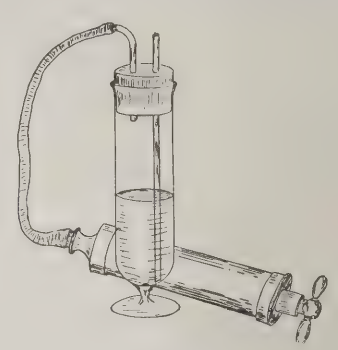
It is well known that the air of an unventilated room which has been occupied by several persons for a considerable time will have a peculiarly unpleasant odour, which is due to the organic matters given off from the lungs and bodies. On this fact De Chaumont based what is known as the smell test; this test, however, cannot be considered in any way reliable.

The method proposed by Pettenkoffer for estimating the amount of CO_2 is to collect the sample of air in a gallon bottle provided with a rubber stopper. The exact capacity of the bottle must be ascertained, and the sample of air pumped into the bottle with a bellows. The CO_2 is calculated from the loss of alkalinity in a measured quantity of lime water. This method gives accurate results, but a knowledge of chemistry is necessary to conduct the test satisfactorily.

A Simple and Effective Test.

The following is another method sometimes adopted :—Collect samples of the air for testing in four bottles, having a capacity of 4ozs., 8ozs., 16ozs., and 32ozs. respectively. The bottles must be clean and dry, and provided with rubber stoppers. A 1-oz. bottle of fresh lime water is now carefully poured into each of the four samples, and the stoppers replaced. Agitate the lime water by shaking each of the bottles for about three minutes, and observe the change in colour of the lime water added in each case. Should the lime water in all four bottles show a milky appearance, it indicates that the sample contains above 2 per cent. CO_2. Should the liquid in the three larger bottles become milky, and the 4-oz. bottle remain clear, the sample contains approximately 1·4 per cent. A milky tinge in the 16-oz. and 32-oz. bottles only indicates 1 per cent.; and should the liquid in the 32-oz. bottle only appear milky, the amount of CO_2 in the sample would be ·06 per cent. No trace of colour in any of the four bottles would indicate that the air was practically pure.

Equally reliable results, however, may be obtained by aspirating the air to be tested through a weak alkali solution coloured with the indicator phenolphthalein. Sodium carbonate or baryta may be employed for the alkali solution, and sufficient phenolphthalein added to give it a pink colour. This is a very convenient apparatus; it is not bulky, and by the use of long tubes the tests may be taken from different heights in the room, which is an advantage. The apparatus consists of a test tube on stand fitted with a rubber stopper having two small bore tubes, one for admitting air for testing, and which is taken to the bottom of the test tube, and the other for connecting to the aspirator. The air may be aspirated through the liquid with an aspirator, or, as shown, by using a small exhaust pump, which is more convenient and just as reliable. The same quantity of liquid should invariably be used for each test, and, to avoid mistakes, the test tube should be marked to take, say, 25 cc. for each test.



A test is first made in the open air by observing the number of aspirations required with the pump to remove the colour from the liquid. Let A represent this number, which will be equal to ·04 per cent. Now thoroughly clean the tube, and ascertain the number of aspirations required to remove the colour by the air to be tested, which number will of course be less, and is represented by B. Then $\frac{A \times \cdot 04}{B}$ = percentage of CO_2 in the air tested.

A Westminster Improvement.—The Improvement Committee of the Westminster City Council has approved a plan submitted by H.M. Office of Woods for an improvement at Whitehall Place. This consists of the opening out of Scotland Yard, the widening of the western end of Whitehall Place, and the stopping up of a roadway in Scotland Yard which now runs round the north side of the old police building. A new building is proposed for H.M. Office of Woods, and a considerable area of valuable building land would be given up to convert the western part of Scotland Yard into a 40ft. road, which will be entirely open.

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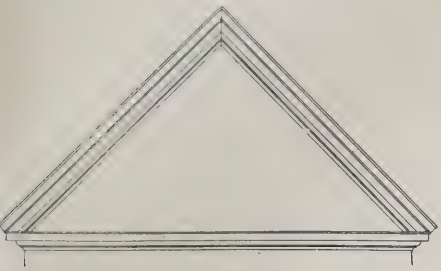
* Extract from a paper on "The Science of the Air with respect to Ventilation," read before the Institute of Sanitary Engineers on May 1st last.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Sixteenth Series.)

CLASS A (ARCHITECTURE).



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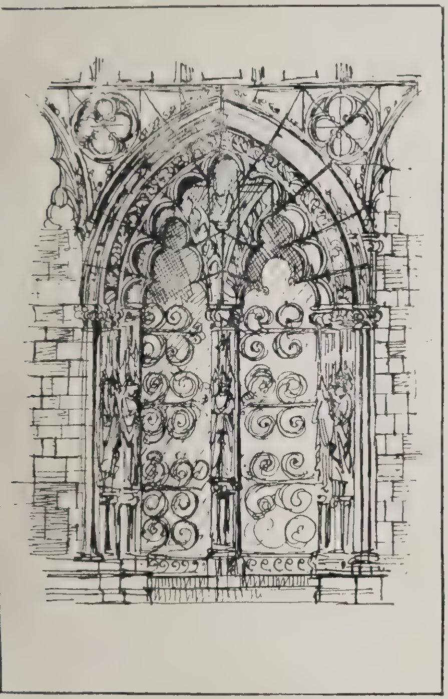

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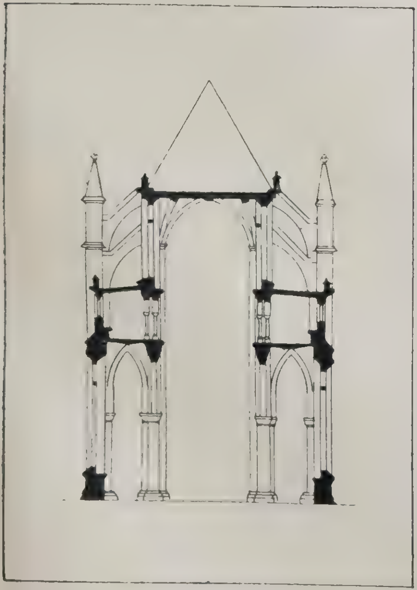


A 33

(This is numbered out of order because "A 33" was inadvertently omitted between the issues of April 24th and May 1st.)

This competition has been instituted with the object of increasing the circulation of The Builders' Journal by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Price.—£10

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

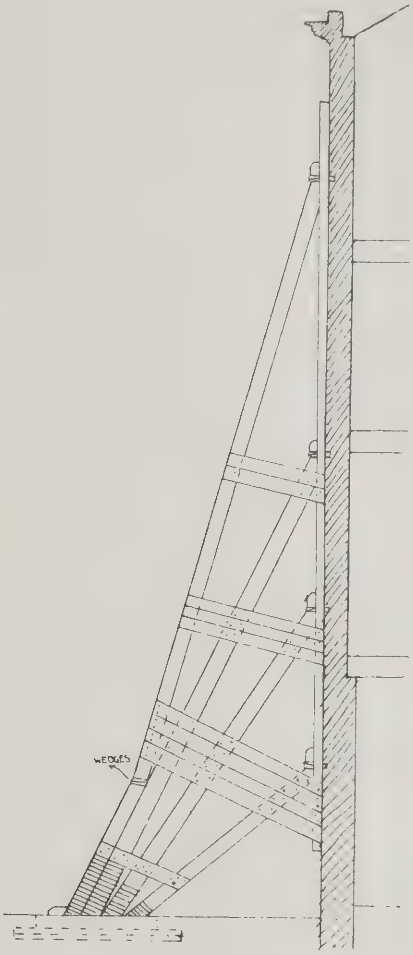
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of The Builders' Journal, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. **In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.**
6. No persons directly or indirectly connected with the staff of The Builders' Journal, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any volation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

(For Coupons see page iv.)

Copies of "The Builders' Journal" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.

CLASS B (BUILDING).



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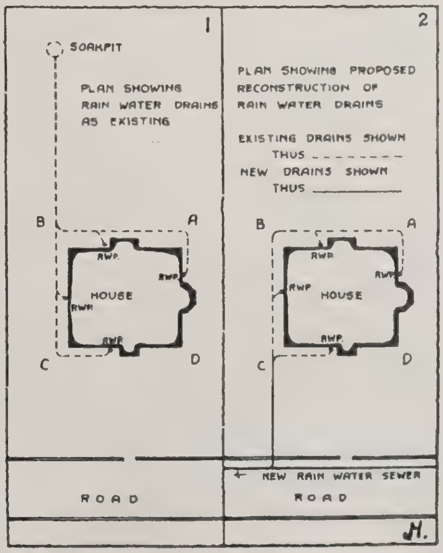
1
SOAKPIT
PLAN SHOWING RAIN WATER DRAINS AS EXISTING
B
A
RWP.
RWP.
HOUSE
RWP.
RWP.
C
D
ROAD
2
PLAN SHOWING PROPOSED RECONSTRUCTION OF RAIN WATER DRAINS
EXISTING DRAINS SHOWN THUS
NEW DRAINS SHOWN THUS
B
A
RWP
RWP
RWP
HOUSE
RWP.
C
D
← NEW RAIN WATER SEWER
ROAD
H.

B 47

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL. *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Bordon Camp (Petersfield).—For the erection of new post-office for H.M. Office of Works, &c. :—

E. & A. Spriggings	£2,374
Cæsar Bros....	2,327
S. Salter...	2,282
Haslemere Builders	2,275
G. A. Kemp	2,251
F. Osman	2,224
Martin, Wells & Co.	2,220
H. Smith...	2,172
R. Cook & Sons*	1,962
F. & G. Foster...	1,873
J. Hayes	1,860

* Accepted.

Cambridge.—Accepted for the extension of the Cavendish Laboratory :—

W. Sindall, Cambridge (including £500 for heating)	£7,135

(Nine tenders submitted.)

Cosham (Hants).—For the erection of bungalow. Mr. F. Cornelius-Wheeler, architect, 5, Abchurch Yard, Cannon Street, London, E.C. :—

H. Craven	£625	0	0
Pryer & Sons*	527	15	0

* Accepted subject to modifications for £449 19s.

Froncysyllte (Wales).—For the erection of two houses and a shop for Mr. Ellis D. Jones. Mr. E. Vaughan-Edmunds, architect, Castle Street, Llangollen :—

Dd. Roberts, Llangollen	£915	0	0
W. F. Humphreys, Cefn	895	0	0
T. J. Jones, Cefn	840	0	0
Watkin, Jones & Sons, Ponkey...	819	0	0
Isaac Jenkins, Johnstown	795	10	0
Davies & Sons, Llangollen	795	0	0
Jno. Carden, Rhosymedre	705	0	0
Jones & Jones, Llangollen*	700	0	0

* Accepted.

Hengoed (near Cardiff).—Accepted for the erection of 28 houses for the Hengoed Cottage Club. Mr. G. A. Treharne, M.I.M.E., architect, Aberdare :—

D. Raymond, 14, Taff Embankment, Cardiff	£4,648

Hereford.—For the erection of a factory for Messrs. Greenlands, Ltd. Messrs. Groome & Bettington, architects, Palace Chambers, Hereford :—

Humphreys, Ltd.	£970	0	0
Bellow & Sons	925	0	0
J. Harrison & Co.	880	0	0
W. Harbrow	868	0	0
Blakeley & Co.	822	2	6
Rowell & Co.	752	0	0
Hill & Smith	736	0	0
Alexander & Duncan	725	0	0
Redpath, Brown & Co.	715	0	0
G. P. Banbury*	705	10	0
Baldwins, Ltd. (ironwork only)...	574	7	6
Ginger, Lee & Co. (stable only)...	135	0	0

* Accepted.

Ilminster.—For the erection of an extension to the Rose Lace Mills, for the Chard Lace Co., Ltd. Messrs. Symes & Madge, architects, Chard, Somerset :—

Thomas Bishop, Ilminster ...	£750	0	0
Walter Coombes, Ilminster	693	12	0
Parsons Brothers & Dunster, Chard	637	10	0
Henry J. Spiller & Son, Taunton	570	0	0
Relleen & Griffiths, Ilminster ...	550	0	0
J. Layzell, Broadway, Ilminster	540	10	0
Alex. Poole,* Ilminster	537	0	0

* Accepted.

London, E.—Accepted for reconstructing the river wall at "The Gun Tavern" Wharf, Blackwall. Mr. Herbert Riches, architect, 3, Crooked Lane, King William Street, London, E.C. :—

G. C. Webb & Co.	£218	17	6

London, N.—For repairs and decorations to premises in Albion Road, Stoke Newington. Mr. Herbert Riches, architect, 3, Crooked Lane, King William Street, London E.C. :—

T. W. Kingsland	£534	18	0
Sheffield Bros.	485	0	0
T. J. Dartnall...	435	0	0
J. T. Robey...	430	0	0
A. W. Derby*	347	0	0
Chapman & Co....	331	17	6

* Accepted.

London, N.E.—For the erection of small stable at rear of shop premises, Lower Clapton. Mr. Herbert Riches, architect, 3 Crooked Lane, King William Street, London, E.C. :—

T. W. Kingsland	£152	16	0
Sheffield Bros.	147	0	0
Rowley Bros.*	125	0	0

* Accepted.

Macduff (N.B.).—Accepted for the erection of villa, "Dun Alastair," for Alexander Robertson, Esq. Mr. Francis Duff Robertson, architect, Keith :—

Mason : Robert Morrison, Macduff	£464	0	0
Carpenter : Alex. Stronach, Huntly	337	0	0
Slater : W. Scott, Macduff... ...	59	5	0
Plasterer : James Clark, Turriff	64	0	0
Plumber : Archibald Strachan, Banff	100	14	0
Painter and glazier : Forbes Watt, Banff	38	10	0
Total	£1,063	9	0

Exclusive of grates, mantels, tiles, enclosing walls, gates, railings, &c.

Widemarsh.—For the erection of new offices for Messrs. Evans & Co. Messrs. Groome & Bettington, architects, Palace Chambers, Hereford :—

W. P. Lewis & Co.	£298
C. Cooke	278
E. W. Wilks	275
Beavan & Hodges*	264

(All of Hereford.)

* Accepted.

Ynysddu (Mon.).—Accepted for the erection of 40 houses for the Alexandra Building Club. Mr. G. A. Treharne, M.I.M.E., architect, Aberdare :—

D. Raymond, 14, Taff Embankment, Cardiff	£6,800

Bankruptcies.

T. H. Ascroft, builder, Colwyn Bay. R.O., May 9.

W. Bennett, builder, Bristol. Liabilities, £1,681; assets, £794.

Jones, Behm & Wilkinson, timber merchants, London. R.O., May 11.

F. Stone, builder, Brislington, Bristol. Liabilities, £1,212; assets, £270.

Mason & Co., builders, Uttoxeter. P.E., Burton-on-Trent C.C., June 19, at 12.

J. Allison & Sons, joiners and builders. P.E., Salford C.C., June 11, at 10.30.

S. Davies, architect and surveyor, Frodsham. P.E., Warrington C.C., June 7, at 11.

D. B. Jones, builder and contractor, Llanelly. P.E., Guildhall, Carmarthen, June 12, at 12.

H. Hughes, builder, Lydd. Gross liabilities, £1,915; £761 expected to rank for dividend; assets, £120.

T. Walsh, joiner and builder, Darwen. Gross liabilities, £1,427; £932 expected to rank; assets, £222; deficiency, £710.

J. T. Chapman, builder, Wimbledon. First meeting, 132, York Road, S.E., May 23, at 11.30. P.E., Kingston C.C., June 11, at 2.30.

A. E. Pryor, builder, Bedford. First meeting, Red Lion Hotel, Bedford, May 24, at 11.30. P.E., Shire Hall, Bedford, June 11 at 11.

F. Bathurst, builder, Rochester. First meeting, 115, High Street, Rochester, May 27, at 12. P.E., Rochester C.C., at 2.30. R.O., May 10.

J. T. Bennett, builder, &c., London and St. Albans. First meeting, Bankruptcy Court, May 24, at 1. P.E., same, June 19, at 11. R.O., May 7.

C. Rickatson, builder, Handsworth. First meeting, 191, Corporation Street, Birmingham, May 23, at 11.30. P.E., Birmingham C.C., June 19, at 2.30.

MacCallum Brothers, builders, Tooting. Unsecured liabilities, £14,935; fully secured, £27,000; assets estimated to realise a surplus of £1,813 over liabilities.

Coming Events.

Saturday, May 25.

Edinburgh Architectural Association.—Visit to Dalkeith Palace and Chapel.

Monday, May 27.

Royal Institute of British Architects.—Meeting at 8 p.m., Report of Reinforced Concrete Committee.

Tuesday, May 28.

Architectural Association of Ireland.—President's valedictory address; election of officers for session 1907-1908.

Architectural Association (Camera and Cycling Club).—Annual general meeting, at 7.30 p.m.

Royal Institute of British Architects.—Special general meeting to consider conditions and instructions for London County Hall Competition, at 8 p.m.

Saturday, June 1.

Architectural Association.—Third summer visit, to East Grinstead (train from London Bridge at 1.40).

Monday, June 3.

Edinburgh Architectural Association.—Visit to Parish Church, Bothwell Castle, and Lennoxlove, Haddington.

Monday, June 10.

Royal Institute of British Architects.—Business meeting; annual elections, at 8 p.m.

Thursday, June 13, to Monday, June 17,

Society of Architects.—Visit to Bath.

Saturday, June 15.

Architectural Association.—Fourth summer visit to new Town Hall, Bromley (Mr. R. Frank Atkinson, F.R.I.B.A., architect).

New Companies.

John Bland & Son, builders and contractors, Salford. Capital : £5,000.

A. M. Prosser & Sons, builders' merchants, 2a, Chandos Road, Redlands, Bristol. Capital : £400.

Charles Marchant, manufacturers of bricks and tiles, &c., 51, North Street, Brighton. Capital : £500.

G. H. Cross & Sons, builders, contractors, &c., Highfield, Isaac's Hill, Cleethorpes. Capital : £5,000.

Hall & Pett, builders, decorators, &c., 64, Portslade Road, Wandsworth Road, London, S.W. Capital : £2,000.

Parkfield and National Brick Co., Bordesley Green Road, Saltley, and Keeley Road, Watery Lane, Birmingham. Capital : £5,000.

Emborough Stone Co., to acquire the business of the Somerset Fullers' Earth & Ochre Co., Ltd., carried on at Emborough, Somerset, and to carry on the business of quarriers, &c. Capital : £8,000.

Shows Co., to acquire from Messrs. Charles Heathcote & Sons and Mr. J. C. Brown, of Manchester, certain plans, drawings and information and the benefit of certain contracts and arrangements made by them, 64, Cross Street, Manchester. Capital : £25,000.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans...	per qr.	1	11	0	1	[illegible]	0
Clover, best...	per load	4	7	0	4	17	6
Hay, good	do.	4	0	0	4	5	
Sainfoin mixture	do.	4	0	0	4	7	
Straw...	do.	1	8	0	1	14	

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	101	0	0	102	0	0
Do. Strong sheets ...	do.	120	0	0	121	0	0
Lead, soft foreign... ...	do.	19	10	0	19	15	0
Do. English	do.	20	5	0	20	7	6
Do. pipes...	do.	23	5	0	23	7	6
Do. sheets	do.	22	12	6	22	15	0
Galvanised Corrugated sheets	do.	13	12	6	13	15	0
Spelter G. M.	do.	26	0	0	26	5	0
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	8	2	6	8	5	0
Marked bars, Staffs. ...	do	8	17	6	9	0	0
Common bars, do. ...	do.	6	17	6	7	0	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	15	0	6	17	6
Angles, Midlands	do.	7	5	0	7	7	6
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	7	6	6	10	0
Channels do. do. do.	do.	6	10	0	6	12	6
Tin, Foreign	do.	192	0	0	193	0	0
Do. English ingots ...	do.	197	0	0	198	0	0
Zinc, sheets, Silesian, ...	do.	30	0	0	30	10	0
Do. do. V.M. ...	do.	30	10	0	31	0	0

TIMBER.

		£	s.	d.	£	s.	d.
Deals, Archangel, White, 2nd, 3×9	per std.	9	10	0		—	
Do. Constanza, White, 3rd, 3×11	do.	8	15	0		—	
Do. do. do. do. 3×9	do.	9	0	0		—	
Do. Kungsgarden, Yellow & White, 3×9	do.	5	10	0		—	
Do. Langrör, Yellow, 3rd, 3×7	do.	11	0	0		—	
Do. do. do. 4th, 3×7	do.	10	0	0		—	
Do. Montreal, Spruce, 2nd, 3×9	do.	9	15	0		—	
Do. do. Pine, 1st, 3×11	do.	21	0	0		—	
Do. Riga, Yellow, 1st & 2nd, 3×8	do.	8	0	0		—	
Do. do. do. do. 2½×7	do.	8	5	0		—	
Do. St. John, Spruce, 1st, 2nd & 3rd, 3×9	do.	8	15	0	9	0	0
Do. do. do. do. 3×7	do.	7	15	0		—	
Do. Skelleftea, Yellow, 1st, 2½×8	do.	9	10	0		—	
Do. do. do. do. 2½×7	do.	10	0	0		—	
Do. Wasa (Wasklot), Yellow, unsorted, 2½×7	do.	9	10	0		—	
Battens, Altappen, Yellow, 2nd, 2×8	do.	9	15	0		—	
Do. Ingramport, Yellow, unsorted, 2×4	do.	7	5	0		—	
Do. Koivnsaari, Yellow, unsorted, 1×4	do.	8	10	0		—	
Do. Langrör, Yellow, unsorted, 2½×6	do.	9	5	0		—	
Do. Oscarsham, Yellow, unsorted, 2×4	do.	8	5	0	9	10	0
Do. St. Petersburg, Yellow, 3rd, 2½×6½	do.	8	10	0		—	
Do. Skelleftea, Yellow, 1st, 2½×6	do.	9	0	0		—	
Do. do. do. do. 2×6	do.	9	10	0		—	
Do. do. do. do. 2×4½	do.	9	0	0		—	
Do. do. do. do. 2×4	do.	9	15	0		—	
Do. do. do. do. 2×3	do.	9	0	0		—	
Do. do. do., unsorted, 2×7	do.	9	10	0		—	
Do. do. do. do. 2×3	do.	9	0	0		—	
Do. Wasa (Wasklot), Yellow, unsorted, 2×4	do.	9	10	0		—	
Do. do. do. do. 2×3	do.	9	0	0		—	
Flooring Boards, Fredriksstad, White, 3rd, 1×7	do.	0	9	3		—	
Do. do. do. do. 1×6	do.	0	8	9		—	
Do. Yellow, do. 1×7	do.	0	10	6		—	
Do. do. unsorted 1×6	do.	0	10	0		—	
Do. do. Yellow and White, 1×7	do.	0	8	3		—	
Do. do. Mixed Yellow 1×6	do.	0	9	9		—	
Do. Mon, Yellow, 1st, 1×6	do.	0	12	0		—	
Do. do. do. do 2nd, 1×6	do.	0	11	0		—	
Do. Soderham, White, 1st & 2nd, 1×7	do.	0	10	6		—	
Do. do. do. do. 1×6	do.	0	10	0		—	
Do. Skonvik, Yellow,6 1st, 1×	do.	0	10	9		—	

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Supplement to
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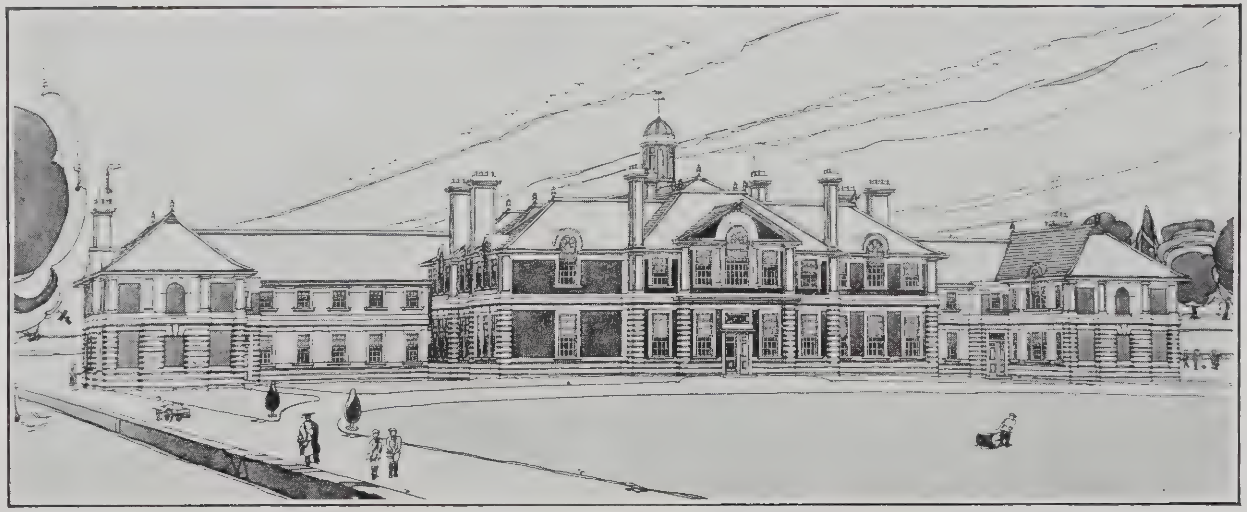
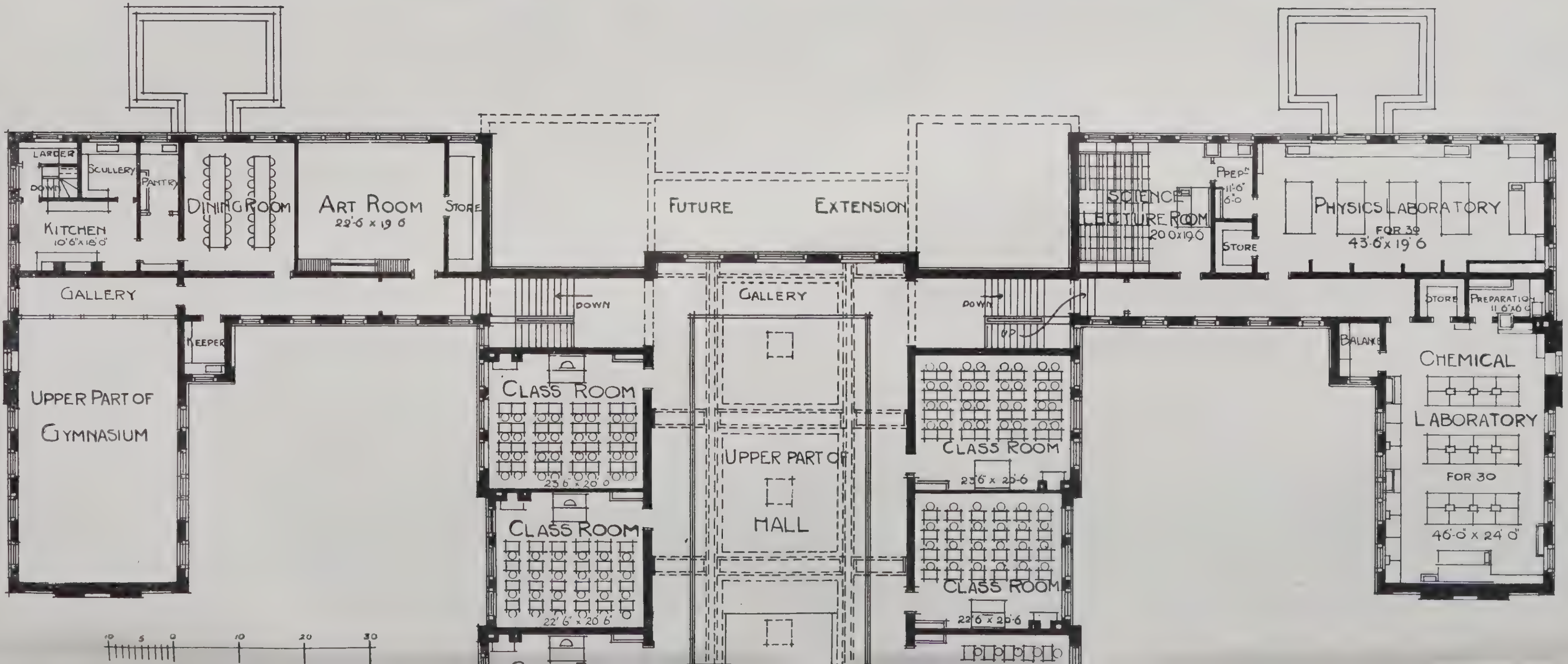
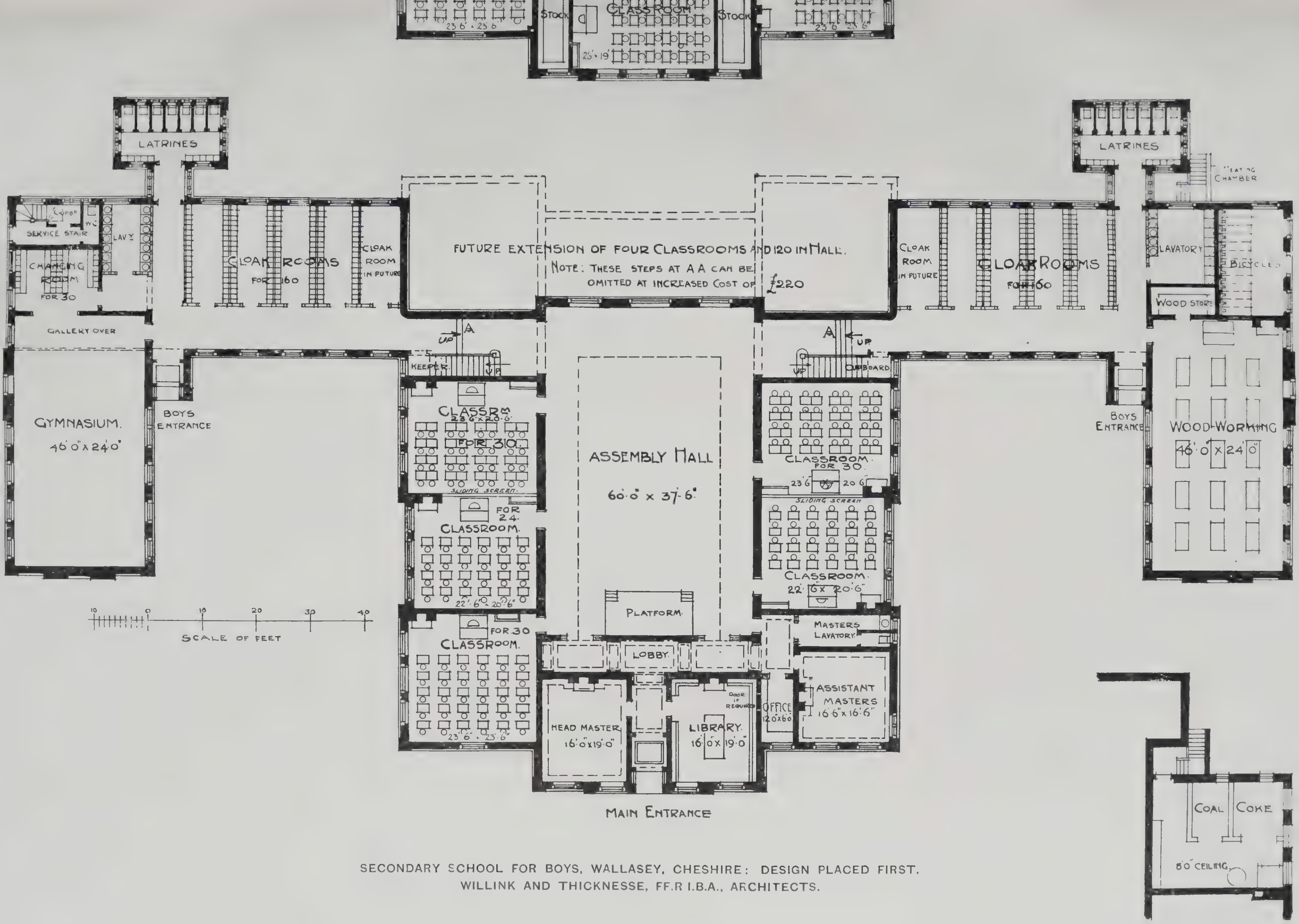
Wednesday, May 29th, 1907.







SECONDARY SCHOOL FOR BOYS, WALLASEY, CHESHIRE: DESIGN PLACED FIRST.
WILLINK AND THICKNESSE, FF.R.I.B.A., ARCHITECTS.

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May 29, 1907.
Volume 25, No. 642

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

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The **"Contractors' Supplement"** is given in this issue.

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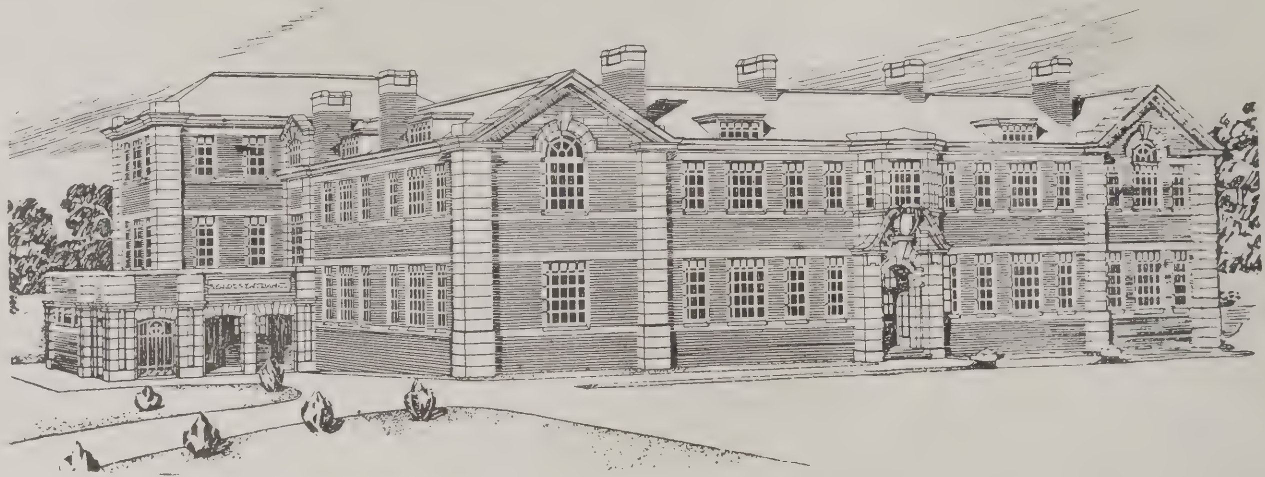
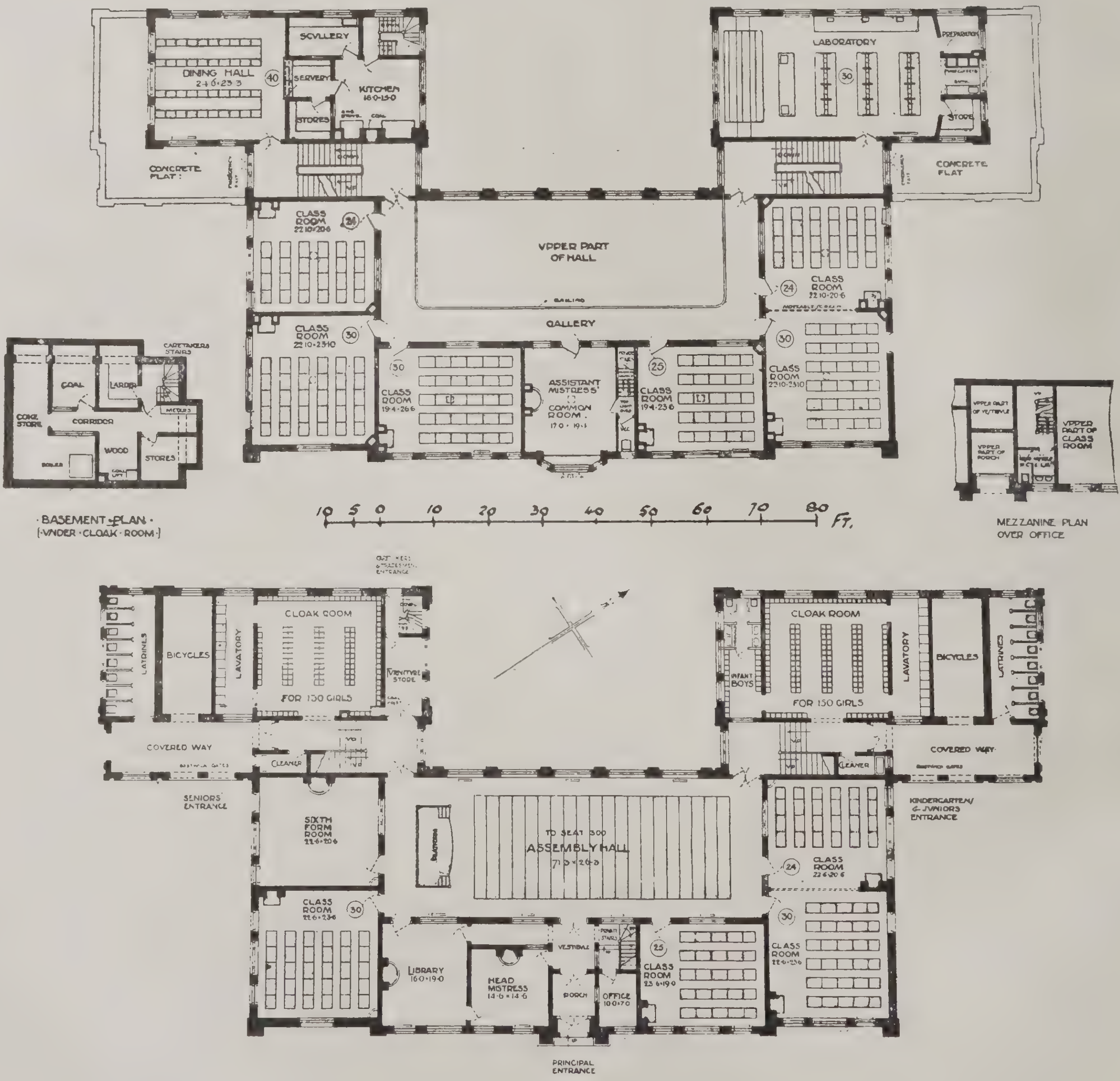
The R.I.B.A. and Reinforced Concrete. IN our issue for March 8th we referred to the labours of the Committee on Reinforced Concrete appointed by the Royal Institute of British Architects, and announced its decision upon various points in the practice and theory of this somewhat new form of construction. In the present issue we publish the report in full, and it will be found that our anticipatory statements were correct. The Committee's work has been extensive, but it is by no means so valuable as that of the Commission appointed by the French Government; indeed, the members of the Institute Committee had nothing like the standing of the members of the French Commission, and they did not take the trouble to ask the advice and assistance of specialists who have had greater practical experience and are not lacking in high theoretical ability. Therefore the Committee's report, though valuable to English architects up to a point—namely, as regards the specification of certain factors to be followed in design and execution (these being conservative and fairly reasonable)—in other respects goes too far, and yet not far enough, for the theoretical data are inadequate to enable architects or engineers to design their own structures, while to the qualified designer they add nothing that is of real service. The addenda by Professor Unwin and Mr. William Dunn are interesting and welcome contributions. The chief thing, however, is the report itself, the value of which consists in its putting an official seal upon this form of construction—leading to its increasing adoption by the architectural profession, and being the forerunner of an agitation for the amendment of the by-laws to allow the use of reinforced concrete in building construction throughout the country. The report, in fact, should lead English architects to look upon reinforced concrete as a thoroughly reliable form of construction. That once accepted generally, the economy it offers both in money, time, and in space occupied, in many circumstances will lead to its adoption largely. It is to be hoped that we shall now progress as rapidly in the use of this valuable innovation in building methods as the Continent and the United States, and no longer be open to the reproach that, while English inventors were first in the field, and English constructors were pioneers in its use, England is now most backward in its use and recognition. There is no doubt we have been far too conservative in the past. We may refer to some remarks by Sir Henry Tanner in the discussion on the report at the Institute meeting last Monday. He said there was no doubt as to the economy of reinforced concrete, even though there might be doubts as to its æsthetic qualities. In one building where he had adopted this form of construction the cost worked out at 2d. per foot cube for the concrete alone, whereas any other method of construction would have cost at least twice that sum. There was no burking the question: reinforced concrete would have to be used by the bulk of the people. Architects had to bear the responsibility for its adoption, whether they employed a specialist or not, and therefore the present report was valuable. We shall have occasion later to criticise the report in detail, but at present we have not the space.

Terrace Houses. In every district it is a familiar sight to see houses in a terrace painted different colours and otherwise disfigured by the whims of the individual owners or tenants. It seems strange that we should continue to permit such an obvious absurdity. It is undoubtedly corrupting to the public taste, and offends the sense of everyone, although it is a human trait that individuals should vie with one another and refuse to come to terms. The matter is bad enough when the houses are built adjoining each other without any conformity to a general design, but the fault is aggravated when the terrace has been designed distinctly as one whole. How often such features as pediments are seen painted half one colour and half another, while gate piers and other parts are treated in a similar incoherent manner. Perhaps the crowning absurdity is a dwarf wall in front of a row of houses painted in strips almost all colours of the rainbow. Even when the owners or tenants have the sense to keep to one colour they more often than not have their premises painted at different times, so resulting in a difference of tone. Another variation of the same process of disfigurement is the structural alteration sometimes carried out in the projection of bay windows and porches, or the substitution of balconies and railings of different design. Control over such details is greatly needed. If we cannot have a public censorship of design in architectural work there should be at least some control over disfigurement of the kind indicated above. Local borough councils ought to have the power to prevent such things. On some estates conditions are inserted in the leases which enable the landlord to require houses to be painted at regular intervals and to prevent structural alterations being carried out without permission of the surveyor, but this control is not sufficiently exercised. In terrace houses landlords should require the external painting to be of uniform colour, and to be done at the same time; and the architectural profession, too, should make this an opportunity for reform.





SECONDARY SCHOOL FOR GIRLS, WALLASEY: DESIGN PLACED FIRST.
APPLEYARD AND QUIGGIN, ARCHITECTS.

WALLASEY SECONDARY SCHOOLS COMPETITION.

At the beginning of the year the Higher Education Sub-Committee for Wallasey invited about twenty architects with experience in school planning and practising in Lancashire and Cheshire to compete in a limited competition for two secondary schools for boys and girls. The accepted designs and those specially mentioned by the assessor (Mr. J. Wreghitt Connon, F.R.I.B.A., of Leeds) were on exhibition to competitors during the afternoon of May 14th, in the Art School, Central Park, Liscard. Judging by the ten schemes on view the award of the assessor is satisfactory, particularly in respect of the designs placed first for both schools; the plans of the second and third premiated designs for the girls' school, however, are disappointing, being hardly suitable for a secondary school.

The Girls' High School.

The site for this building is a symmetrical plot of land, almost square, with a south-east aspect. The ground has a considerable slope from the east to the south boundary line; this was the principal difficulty with which competitors had to contend, and there was also the fact that the main entrances, with adjoining official rooms, occupied the front of the site and most of the valuable light suitable for classrooms. The conditions of the competition were well prepared and fairly reasonable in every respect, although it is to be regretted that no premiums were offered. Both accommodation and type of plan were clearly stated. The former included 11 classrooms and a kindergarten room for about 295 scholars, with art, cookery and music rooms; also dining hall and lecture hall and laboratory forming one large room. No gymnasium was asked for, but the assembly hall could be used for this purpose and for school drill, with a store-room conveniently placed for apparatus. The school had to be planned with a well-proportioned assembly hall of sufficient area to accommodate all the pupils on the floor, exclusive of the platform. Easy access from the main entrances to the hall for school concerts, &c., was absolutely necessary, and corridors had to be avoided as far as possible.

Design placed First.

The plans of Messrs. Appleyard and Quiggin, A.R.I.B.A., of 67, Lord Street Liverpool, were placed first by the assessor, and have been formally accepted by the Education Committee. The arrangement of classrooms, entrances, conveniences, &c., and the absence of corridor, is all that could be desired; although in outline the plan is irregular, yet it is a good working and serviceable scheme suitable for the site. The position allotted to the playground shown on the block plan is open to criticism, as more privacy might have been secured if this recreation ground had been placed at the rear of the building, especially as this is a girls' high school and faces a public road. In the planning of the ground floor the architectural balance looks upset by the arrangement of the library, head-mistress's and official suite; these might have been better planned without detriment to their respective uses. The hall is a trifle long in shape, but doubtless correct in area in proportion to the number of scholars. In its arrangement of the hall, and classrooms around same, this scheme follows the orthodox secondary school type of plan. When all the slight advantages are seriously considered it is questionable whether the entire isolation of the hall by means of a lengthy corridor is worth the extra expense in building. It would be a convenience in this scheme if the lavatories on the ground floor had other means of access than through the cloakroom, so that the latter room could be locked at certain hours, and pilfering thus prevented: a communicating door from the main vestibule would answer this purpose, instead of the cloakroom entrance. The main corridor is narrow, and contains some steps which are badly placed. The first-floor plan is well balanced, though an objectionable feature is the dining-room outlook, which is awkwardly arranged, being rather near the latrines. These details can easily be amended. As a whole the plans comply with the requirements of the competition and form an interesting contrast to some recent schemes for similar schools. The elevations are plain and severe. Some architectural character and suitable ornamental features would help to relieve the mediocre effect. According to the conditions the building had to be erected for about £9,000, which works out at £30 per scholar.

Design placed Second.

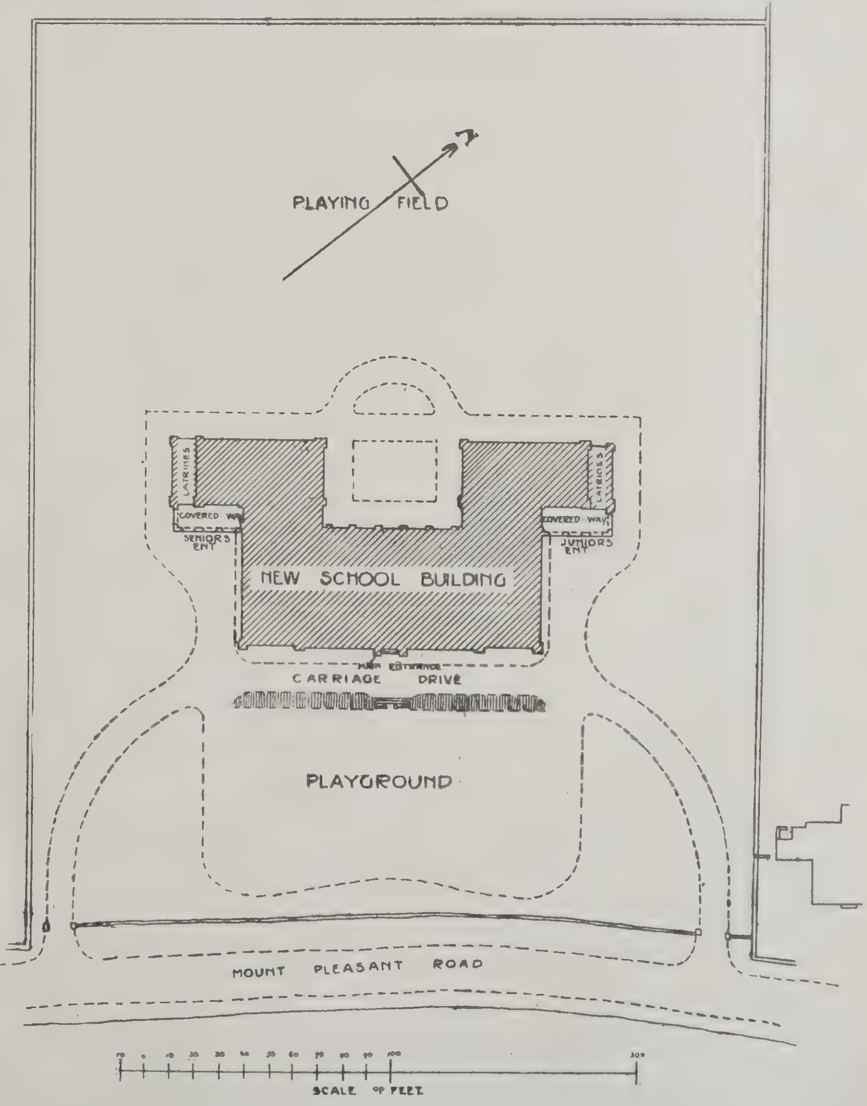
This was submitted by Messrs. T. Mellard Reade and Son, of Liverpool. In the disposition of the buildings and playgrounds on the site, this scheme was not unlike an elementary school. The plan appeared balanced in outline, though the internal arrangement was not satisfactory, owing to the valuable space occupied by many stores and staff conveniences. As a whole this design was not well favoured by the other competitors, and the position allotted to it created some surprise. The elevations were of the ordinary school-board type, and a sepia perspective did not assist the set.

Design placed Third.

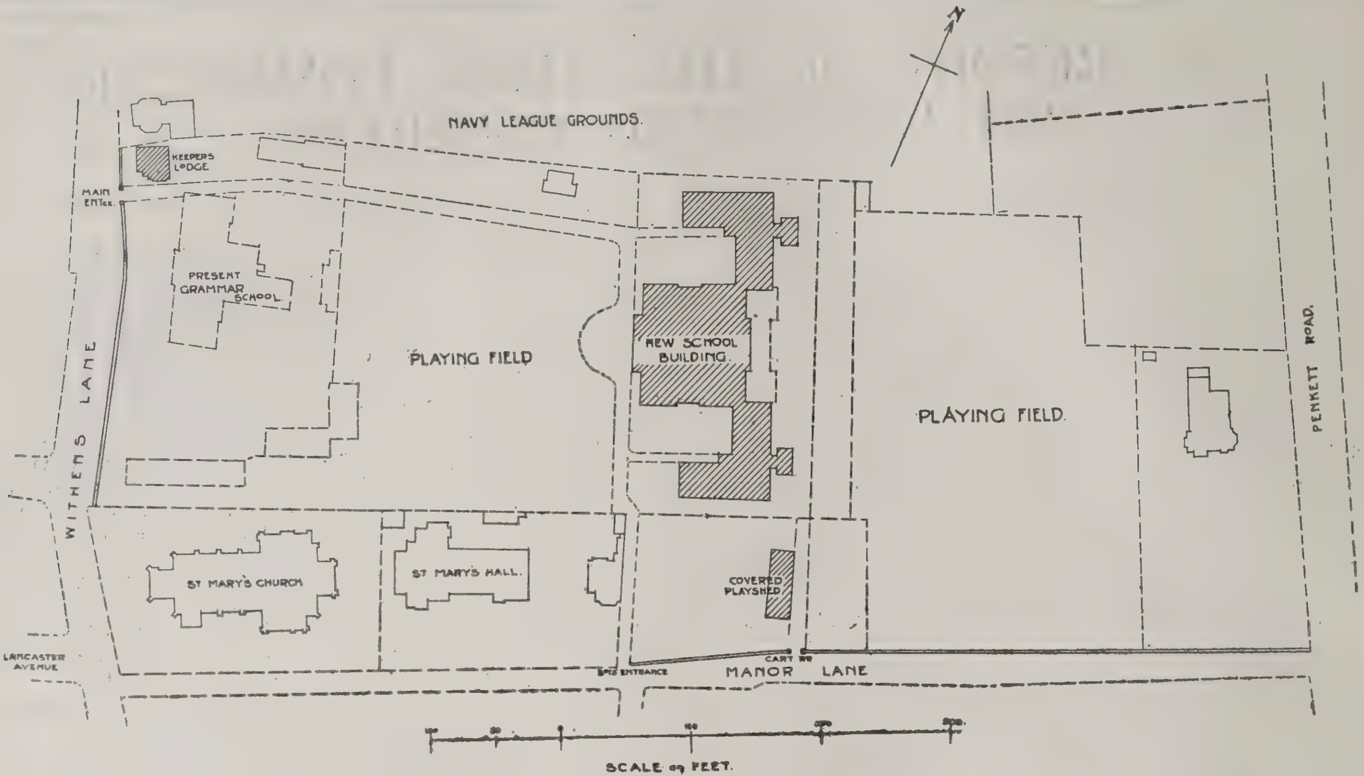
This position was awarded to Mr. Joseph Holt, A.R.I.B.A., of Manchester. In outline the plan formed roughly the letter H placed thus. ⌶. The scheme had quite a disjointed appearance owing to so many breaks and projections. Entrances were not ideal and could have been improved upon, and the stairs were not always workable. The external treatment was not unlike the second-placed design: it was illustrated by a very stiff and mechanical perspective.

The Boys' Grammar School.

Practically the same conditions were placed before the competitors for this school, with a few variations in the requirements. Twelve classrooms to accommodate 340 scholars, with two or more classrooms for future extension, together with laboratory for chemistry and physics, science lecture-room, art-room, dining hall, workshop and gymnasium, completed the special rooms, with the usual staff suite. The site is awkward in shape owing to certain restrictions of the Education Committee as to the position of the



SECONDARY SCHOOL FOR GIRLS, WALLASEY: BLOCK PLAN OF DESIGN PLACED FIRST.
APPLEYARD AND QUIGGIN, ARCHITECTS.



SECONDARY SCHOOL FOR BOYS, WALLASEY: BLOCK PLAN OF DESIGN PLACED FIRST.
WILLINK AND THICKNESSE, FF.R.I.B.A., ARCHITECTS.

building on it; in many cases this led competitors to disregard the aspect of the classrooms in an endeavour to comply with the special building lines. The accepted design and those placed second and third are of a higher merit than the girls' school designs, excepting the accepted scheme. This competition appears to have been keener, and the assessor's award is more satisfactory to those who submitted designs.

Design placed First.

This position has been awarded to a fine set of drawings submitted by Messrs. Willink and Thicknesse, FF.R.I.B.A., of 14, Castle Street, Liverpool. At a glance it is evident that this scheme is practically on the same lines as the successful design for the Goole Secondary School (published in THE BUILDERS' JOURNAL for March 6th last) by this firm under the same assessor. The plan fits the site and is well balanced, with a future extension placed to the rear. It is noticeable that one-half of the classrooms face north. The corridor behind the main entrance is lit by a glazed screen, which in turn is borrowed from the assembly hall. More light might also be obtained for the main stairs. No through passage is shown for the scholars from the west to the east playing fields; this is a drawback, seeing that the conveniences can only be entered from the west side. The position of the scholars' entrance is very close to the wings and not near enough to the cloaks. Changing space for the gymnasium could be enlarged with advantage, with separate lavatory, w.c., and also a shower bath. All the elevations are quietly designed. The cost of the building was not to exceed £40 per scholar.

Design placed Second.

This position was awarded to the scheme of Mr. Richard Holt, of Liverpool. The axis of the plan on the site was the same as the first-placed design, but the scheme was much more compact and showed less corridor, and had only one future classroom, with north aspect. Objection might be raised to the narrow main stairs and long gallery around the hall on the upper floor, and the future extension was not so good. External corner classrooms ought to have been selected for future use. The plans displayed a thorough knowledge of the subject, but the elevations looked hurriedly drawn.

Design placed Third.

This was submitted by Mr. Matthew Honan, of Liverpool. The scheme was on the separate block system, connected by covered ways. It showed much thought and care in the planning and the arrangement of the rooms, though the principal stairs in the two schemes submitted by this architect did not look suitable for the rapid exit of school children, winders being very undesirable in the stairs of a public institution. All the elevations were better designed than many of the schemes on exhibition, and were accompanied by a perspective view delicately rendered in brown ink—doubtless the work of Mr. Raffles Davison.

Views and Reviews.

Rough Estimates

Mr. Coleman's excellent little price-book of approximate estimates of building and engineering work has reached a third edition, with which it has been considerably revised and enlarged, while an entirely new section has been added in the form of "Building Notes and Memoranda." The approximate estimates given in the book, which is in handy pocket-book form, are much better cross referenced, or rather we should say that the information is duplicated for convenience in reference. For instance, we find the same particulars given under the heading of "Iron Staircases" as under "Staircases, Iron." In the case, however, of the latter heading, the actual costs of some staircases are added. This feature of giving in many cases the price of actually completed work that is accessible is most useful. It supplements the general prices in the best way, and enables a fairly accurate comparison to be made between a proposed building and one carried out, and the proportionate price to be satisfactorily determined. Thus, for instance, supposing the price given by Mr. Coleman is 5½d. to 7d. per foot cube we may, from a comparison of the building with some of the examples he gives particulars of, ascertain whether we should estimate the building at the lower figure or at an intermediate figures, say 6d. per foot cube. For architects, surveyors, and, indeed, all those who have to deal with building works, the book is especially fitted. It enables one to quickly ascertain a price that is not likely to be very far wrong, and thus is most valuable in arranging the preliminaries of works. In the majority of cases Mr. Coleman is careful to give the date when the example referred to was completed. This is, of course, most important for comparison, as after a few years the cost of building, especially in some districts, may have increased considerably. On the whole the examples are fairly up-to-date.

"Approximate Estimates: A Pocket Book for Estimating," by T. E. Coleman. London: E. & F. N. Spon, Ltd., 57, Haymarket.

Lettering.

This specimen book of alphabets we can hardly recommend. The lettering is not good, and the copying of the styles given in the book would be most regrettable from an artistic point of view. Most of the alphabets consist of the usual sign-writer's sort of lettering, except, perhaps, that they are rather worse than what is usually obtainable. The coloured plate included in the book in order to show what can be done in decorative sign-writing is simply atrocious.

John M. Clark's "Series of Alphabets, &c., for Sign Writers, Decorators, Designers and Draughtsmen," Book No. 2. Manchester: John Heywood, Ltd., Deansgate and Ridgfield. Price 1s. nett.

THE REPORT OF THE R.I.B.A. COMMITTEE :: ON REINFORCED CONCRETE ::

A meeting of the Royal Institute of British Architects was held on Monday evening at 9, Conduit Street, W., the chair being occupied by Mr. T. E. Collcutt, president.

Sir Henry Tanner, I.S.O., F.R.I.B.A., then presented the provisional report of the Joint Reinforced Concrete Committee. We publish it in full, together with the addenda, in this issue.

The following is the complete list of the members of the Committee and the various bodies represented:—

Members	Body represented
Sir Henry Tanner, I.S.O. F.R.I.B.A. (Chairman) T. Walmsley, M.Inst.C.E., Hon. A.R.I.B.A. William Dunn, F.R.I.B.A. Max Clarke, F.R.I.B.A. H. D. Searles-Wood F.R.I.B.A. (Hon. Secretary)	Representing the R.I.B.A.
Thomas Henry Watson, F.R.I.B.A. E. Dru Drury. F.R.I.B.A.	Representing the District Surveyors' Association.
Benjamin I. Greenwood Frank May, J.P.	Representing the Institute of Builders.
A. E. Collins, M.Inst.C.E. J. W. Cockerill, M.Inst.C.E., A.R.I.B.A.	Representing the Municipal and County Engineers' Association.
Colonel C. B. Mayne, R.E. (Vice-Chairman) Major E. M. Paul, R.E.	Representing the War Office.

C. H. Colson, M.Inst.C.E., Representing the Admiralty.
Professor W. C. Unwin, F.R.S., Hon. A.R.I.B.A. (Vice-Chairman).
Charles F. Marsh, M.Inst.C.E., M.Am.Soc.C.E.
Colonel F. Winn, R.E.

Sir Henry Tanner, in introducing the discussion on the report, explained that the Committee had appointed three sub-committees—one to deal with fire resistance, a second with construction, and the third to deal with formulæ. These sub-committees had to study an enormous mass of material. Messrs. Cubitt and Co. had provided the Committee with 17 beams, which were tested under Professor Unwin's supervision. These were the only experiments conducted by the Committee. Their resources did not permit of more. They had endeavoured to provide a good working guide which could be used by architects as a basis upon which tenders might be obtained. Special forms of reinforcement were not referred to in the report, so as not to favour any special systems. The rules were not claimed as final, by any means. He moved the adoption of the report, subject to an alteration of clause 2—namely, to substitute the word "lodged" for the word "submitted," in the phrase, "shall be submitted to and approved by the local authority." He also moved that copies of the report should be sent, with an explanaory letter, to the Local Government Board and the London County Council.

Mr. John Slater seconded the motion for the adoption of the report.

Mr. E. F. Etchells raised several questions regarding the correctness of the mathematics in the report. He objected o the use of the term "accidental oad." He thought "superimposed load" would be better. He called attention to he fact that in paragraph (3) of Clause 1 of the "Methods of Calculation" it was tated that 10 per cent. reduction of the ccidental load was allowed to come off olumns or piers, whereas in the recommendations of the Institute in regard o steel-frame buildings only 5 per cent. reduction was permitted. This favoured reinforced concrete unduly, because they should be compared on the same basis, whichever was preferable. He thought that it would have been preferable in the first diagram to have substituted $\frac{t}{m}$ for t, so as to have made the curve a straight line and render the distribution of stresses clearer. In the third equation, relating to beams of T section, he thought there was a literal error, the second term in the bracket under the square root sign being given as $\frac{A_t^2 m^2}{b_1^2 d_1^2}$, whereas it should be $\frac{A_t^2 m^2}{b_1^2 d^2}$. Further on he thought the equation for kd was wrong. Again, in connection with eccentrically loaded columns the first equation for the section modulus $Z = \frac{1}{3} nAh$ should, to conform with Professor Unwin's appendix, be $Z = 2nAh$. Shortly after this, in the title to Case I., the word "symmetrically" was used. This he thought ambiguous, as reinforcements arranged in a circle would come under this term. In the equation for the section modulus in Case III. for a column of circular section with reinforcing bars arranged in a circle, $\frac{1}{4}$ should be substituted for $\frac{1}{16}$, he suggested, from comparing Professor Unwin's formula in Appendix III. In this last, in the fourth line before "Example I.," after the words "for a circular section" should be added: "with all bars equidistant from the neutral axis." He seconded the vote of thanks.

Major Paul, speaking for the War Department, said it would undoubtedly utilise reinforced concrete in the future. Reinforced concrete offered great possibilities for the construction of fortifications, and he expressed the opinion that experiments would be conducted, with the aid of the Royal Engineers to study the effects of projectiles on it.

Mr. Matt Garbutt expressed some doubts as to the protection of the steel against rusting. He thought rust would certainly destroy the adhesion, and that mechanical bond was therefore advisable. He emphasised the importance of great care in the construction.

Mr. Charles F. Marsh said that rusting of steel did not occur in reinforced concrete work. It was advisable, however, to coat the reinforcement with cement grout, which could easily be applied with a whitewash brush. He said a slight film of rust was an advantage as regards adhesion, which was sufficient in most cases with round rods, especially if the ends were split, as they should be. Of course, care and good supervision were necessary, just as in steel construction.

Mr. J. J. Burnet thought it was inadvisable for the report to be taken as a text-book issued by the Institute.

Messrs. H. D. Searles-Wood, William Dunn and Edwin T. Hall also spoke.

After some remarks by Mr. Collcutt, the report was adopted, subject to the criticisms of the meeting being considered by the Committee. The vote of thanks was also carried.

THE REPORT.

1. Reinforced concrete is used so much in building and engineering construction that a general agreement on the essential requirements of good work is desirable.

The proposals which follow are intended to embody these essentials, and to apply generally to all systems of reinforcement.

Good workmanship and materials are essential in reinforced concrete. With these and good design, structures of this kind appear to be trustworthy. It is essential that the workmen employed should be skilled in this class of construction.

Very careful superintendence is required during the execution of the work in regard to:—

(*a*) The quality, testing, and mixing of the materials.

(*b*) The sizes and positions of the reinforcements.

(*c*) The construction and removal of centering.

(*d*) The laying of the material in place, and the thorough punning of the concrete to ensure solidity and freedom from voids.

If the metal skeleton is properly coated with cement, and the concrete is solid and free from voids, there is no reason to fear decay of the reinforcement in concrete of stone, gravel, cinder, coke-breeze, &c., made with clean fresh water.

2. The by-laws regulating building in this country require external walls to be in brick, or stone, or concrete of certain specified thicknesses. In some places it is in the power of the local authorities to permit a reduced thickness of concrete when it is strengthened by metal; in other districts no such power has been retained. We are of opinion that all by-laws should be so altered as to expressly include reinforced concrete amongst the recognised forms of construction.

A section should be added to the by-laws declaring that when it is desired to erect buildings in reinforced concrete, complete drawings showing all details of construction and the sizes and positions of reinforcing bars, a specification of the materials to be used and proportions of the concrete, and the necessary calculations of strength based on the rules contained in this report, signed by the person or persons responsible for the design and execution of the work, shall be submitted to and approved by the local authority.

3. *Fire Resistance.*—(*a*) Floors, walls and other constructions in steel and concrete formed of incombustible materials prevent the spread of fire in varying degrees according to the composition of the concrete, the thickness of the parts, and the amount of cover given to the metal.

(*b*) Experiment and actual experience of fires show that concrete in which limestone is used for the aggregate is disintegrated, crumbles and loses coherence when subjected to very fierce fires, and that concretes of gravel or sandstones also suffer, but in a rather less degree.* The metal reinforcement in such cases generally retains the mass in position, but the strength of the part is so much diminished that it must be renewed.

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* The smaller the aggregate the less the injury

Concrete in which coke-breeze, cinders or slag form the aggregate, is only superficially injured, does not lose its strength, and in general may be repaired. Concrete of broken brick suffers more than cinder concrete and less than gravel or stone concrete.

(*c*) The material to be used in any given case should be governed by the amount of fire-resistance required, as well as by the cheapness of, or the facility of procuring, the aggregate.

(*d*) Rigidly attached web members, loose stirrups, bent-up rods, or similar means of connecting the metal in the lower or tension sides of beams or floor slabs (which sides suffer most injury in case of fire) with the upper or compression sides of beams or slabs not usually injured, are very desirable.

(*e*) For main beams a covering of 1½in. to 2ins. of concrete over the metal reinforcement appears from experience in actual fires to afford ample protection to the structural parts. In floor slabs the cover required may be reduced to 1in.

All angles should be rounded or splayed to prevent spalling off under heat.

(*f*) More perfect protection to the structure is required under very high temperature, and in the most severe conditions it is desirable to cover the concrete structure with fire-resisting plastering which may be easily renewed.

Columns may be covered with coke-breeze concrete, terra-cotta, or other fire-resisting facing.

Materials.

4. *Cement.*—Only Portland cement complying with the requirements of the specification adopted by the British Engineering Standards Committee should be employed; in general the slow-setting quality should be used. Every lot of cement delivered should be tested, and in addition the tests for soundness and time of setting, which can be made without expensive apparatus, should be applied frequently during construction.

The cement should be delivered on the work in bags or barrels bearing the maker's name and the weight of the cement contained.

5. *Sand.*—The sand should be composed of hard grains of various sizes up to particles which will pass a quarter-inch square mesh, but of which at least 75 per cent. should pass ⅛-in. square mesh. Fine sand alone is not so suitable, but the finer the sand the greater is the quantity of cement required for equal strength of mortar. It should be clean and free from ligneous, organic, or earthy matter. The value of a sand cannot always be judged from its appearance, and tests of the mortar prepared with the cement and the sand proposed should always be made. Washing sand does not always improve it, as the finer particles which may be of value to the compactness and solidity of the mortar are carried away in the process.

6. *Aggregate.*—The aggregate, consisting of gravel, hard stone, or other suitable material, should be clean and angular, varied in size as much as possible between the limits of size allowed for the work. In all cases material which passes a sieve of a quarter-inch square mesh should be reckoned. The maximum allowable size is usually ¾-inch. The maximum limit must always be such that the aggregate can pass between the reinforcing bars and between these and the centering.

The sand should be separated from the gravel or broken stone by screening before the materials are measured.

7. *Proportions of the Concrete.*—In all cases the proportions of the cement, sand, and aggregate should be separately specified in volumes.

As the strength and durability of reinforced concrete structures depend mostly on the concrete being properly proportioned, it is desirable that in all important cases tests should be made as described herein with the actual materials that will be used in the work before the detailed designs for the work are prepared.

In no case should less dry cement be added to the sand when dry than will suffice to fill its interstices, but subject to that the proportions of the sand and cement should be settled with reference to the strength required, and the volume of mortar produced by the admixture of sand and cement in the proportions arranged should be ascertained.[*]

The interstices in the aggregate should be measured, and at least sufficient mortar allowed to each volume of aggregate to fill the interstices and leave at least 10 per cent. surplus.

For ordinary work a proportion of one part of cement to two parts sand will be found to give a strong, practically watertight mortar, but where special watertightness or strength is required, the proportion of cement must be increased.

The amount of cement added to the aggregate should be determined on the work by weight. The weight of a cubic foot of cement for the purpose of proportioning the amount of cement to be added may be taken at 90lbs.

8. *The metal* used should be steel having the following qualities:—

(*a*) An ultimate strength of not less than 60,000lbs. per sq. in.

(*b*) An elastic limit of not less than 50 per cent., or more than 60 per cent. of the ultimate.

(*c*) An elongation of not less than 22 per cent. in the lengths stated below.

(*d*) It must stand bending cold 180° to a diameter of the thickness of pieces tested without fracture on outside of bent portion.

In the case of round bars the elongation should not be less than 22 per cent., measured on a gauge-length of eight diameters. In the case of bars over one inch in diameter the elongation may be measured on a guage-length of four diameters, and should then be not less than 27 per cent. For other sectional material the tensile and elongation tests should be those prescribed in the British Standard Specification for Structural Steel.

Before use in the work the metal must be clean and free from scale or loose rust. It should not be oiled or painted, but a wash of thick Portland cement grout is desirable.

Welding should in general be forbidden; if it is found necessary, it should be at points where the metal is least stressed, and it should never be allowed without the special sanction of the architect or engineer responsible for the design.

The reinforcement ought to be placed and kept exactly in the positions marked on the drawings, and, apart from any consideration of fire resistance, ought not to be nearer the surface of the concrete at any point than 1 inch in beams and ½ inch in floor slabs or other thin structures.

9. *Mixing: General.*—In all cases the concrete should be mixed in small batches and in accurate proportions, and should be laid as rapidly as possible.

Hand-Mixing.—When the materials are mixed by hand they are to be turned over and thoroughly mixed on a clean platform until the colour of the cement is uniformly distributed over the aggregate.

Machine-Mixing.—Whenever practicable the concrete should be mixed by machinery.

10. *Laying.*—The thickness of loose concrete that is to be punned should not exceed three inches before punning, especially in the vicinity of the reinforcing metal. Special care is to be taken to ensure perfect contact between the concrete and the reinforcement, and the punning to be continued till the concrete is thoroughly consolidated. Each section of concreting should be as far as possible completed in one operation; when this is impracticable, and work has to be recommenced on a recently laid surface, it is necessary to wet the surface; and where it has hardened it must be hacked off, swept clean, and covered with cement grout. Work should not be carried on when the temperature is below 34 degs. Fahr. The concrete, when laid, should be protected from the action of frost, and shielded against too rapid drying from exposure to the sun's rays or winds, and kept well wetted. All shaking and jarring must be avoided. The efficiency of the structure depends chiefly on the care with which the laying is done.

Water.—The amount of water to be added depends on the temperature at the time of mixing, the materials, and the state of these, and other factors, and no recommendation has therefore been made. Sea-water should not be used.

11. *Centering or Casing.*—The centering must be of such dimensions, and so constructed, as to remain rigid and unyielding during the laying and punning of the concrete. It must be so arranged as to permit of easing and removal without jarring the concrete. Provision should be made wherever practicable for splaying or rounding the angles of the concrete. Timber when used for centering may be advantageously limewashed before the concrete is deposited.

12. *Striking of Centres.*—The time during which the centres should remain up depends on various circumstances, such as the dimensions or thickness of the parts of the work, the amount of water used in mixing, the state of the weather during laying and setting, &c., and must be left to the judgment of the person responsible for the work. The casing for columns, for the sides of beams, and for the soffits of floor slabs not more than 4ft. span must not be removed under eight days; soffits of beams and of floors of greater span should remain up for at least fourteen days, and for large span arches

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[*] For convenience on small works the following figures may be taken as a guide, and are probably approximately correct for medium silicious sand:—

Parts Cement.		Parts Sand.		Parts Mortar.
1	+	½	=	1·20
1	+	1	=	1·50
1	+	1½	=	1·90
1	+	2	=	2·35
1	+	2½	=	2·70
1	+	3	=	3·00

for at least twenty-eight days. The centering of floors in buildings which are not loaded for some time after the removal of same may be removed in a short time; the centering for structures which are to be used as soon as completed must remain in place much longer. If frost occurs during setting, the time should be increased by the duration of the frost.

13. *Testing.*—Before the detailed designs for an important work are prepared, and during the execution of such a work, test pieces of concrete should be made from the cement, sand, and aggregate to be used in the work, mixed in the proportions specified. These pieces should be either cubes of not less than four inches each way, or cylinders not less than four inches diameter, and of a length not less than the diameter. They should be prepared in moulds, and punned as described for the work. Not less than four cubes or cylinders should be used for each test, which should be made twenty-eight days after moulding. The pieces should be tested by compression, the load being slowly and uniformly applied. The average of the results should be taken as the strength of the concrete for the purposes of calculation, and in the case of concrete made in proportions of one cement, two sand, four hard stone, the strength should not be less than 2,400lbs. per sq. in.

Loading tests on the structure itself should not be made until at least two months have elapsed since the laying of the concrete. The test load should not exceed one and a half times the accidental load. Consideration must also be given to the action of the adjoining parts of the structure in cases of partial loading. In no case should any test load be allowed which would cause the stress in any part of the reinforcement to exceed two-thirds of that at which the steel reaches its elastic limit.

METHODS OF CALCULATION.

Data.

1. *Loads.*—In designing any structure there must be taken into account: (a) The weight of the structure. (b) Any other permanent load, such as flooring, plaster, &c. (c) The accidental load.* (d) In some cases also an allowance for vibration and shock.

Of all probable distributions of the load, that is to be assumed in calculation which will cause the greatest straining action.

(1.) The weight of the concrete and steel structure may be taken at 150lbs. per cubic foot.

(2) In structures subjected to very varying loads and more or less vibration and shock, as, for instance, the floors of public halls, factories, or workshops, the allowance for shock may be taken equal to half the accidental load. In structures subjected to considerable vibration and shock, such as floors carrying machinery, the roofs of vaults under passage ways and courtyards, the allowance for shock may be taken equal to the accidental load.

(3) In the case of columns or piers in buildings, which support three or more floors, the load at different levels may be estimated in this way. For the part of the roof or top floor supported, the full accidental load assumed for the floor and roof is to be taken. For the next floor below the top floor 10 per cent. less than the accidental load assumed for that floor. For the next floor 20 per cent. less, and so on to the floor at which the reduction amounts to 50 per cent. of the assumed load on the floor. For all lower floors the accidental load on the columns may be taken at 50 per cent. of the loads assumed in calculating those floors.

Beams.

2. *Spans.*—These may be taken as follows: For beams the distance from centre to centre of bearings. For slabs supported at the ends, the clear span + the thickness of slab. For slabs continuous over more than one span the distance from centre to centre of beams.

3. *Bending Moments.*—In the most ordinary case of a uniformly distributed load of w lbs. per inch run of span the bending moments will be as follows:—

(*a*) *Beam or slab simply supported at the ends.*—Greatest bending moment at centre of span of l inches is equal to $w\,l^2/8$in. lbs.

(*b*) *Beam continuous over several spans, or encastré or fixed in direction at each end.*—The greatest bending moments are at the ends of the span, and the beam should be reinforced at its upper side near the ends. If continuity can be perfectly relied on, the bending moment at the centre of the span is $wl^2/24$, and that over the supports—$wl^2/12$. If the continuity is in any way imperfect, the bending moment at the centre will in general be greater, and that at the supports less, but the case is a very indefinite one. It appears desirable that generally in building construction the centre bending moment should not be taken less than $wl^2/12$. The bending moment at the ends depends greatly on the fixedness of the ends in level and direction. When continuity and fixing of the ends, whether perfect or imperfect, is allowed for in determining the bending moment near the middle of the span, the beam or slab must be designed and reinforced to resist the corresponding bending moments at the ends.

When the load is not uniformly distributed the bending moments must be calculated on the ordinary statical principles.

4. *Stresses.*—The internal stresses are determined as in the case of a homogeneous beam, on these approximate assumptions:—

(*a*) The coefficient of elasticity in compression of stone or gravel concrete, not weaker than 1 : 2 : 4, is treated as constant and taken at one-fifteenth of the coefficient of elasticity of steel.

(*b*) The resistance of concrete to tension is neglected, and the steel reinforcement is assumed to carry all the tension.

(*c*) The stress on the steel reinforcement is taken as uniform on a cross section, and that on the concrete as uniformly varying.

5. *Working Stresses.*—If the concrete is of such a quality that its crushing strength is 2,400 to 3,000lbs. per sq. in. after twenty-eight days, and the steel has a tenacity of not less than 60,000lbs. per sq. in., the following stresses may be allowed:—

	lbs. per sq. in.
Concrete, in compression in beams subjected to bending	600
Concrete in columns under simple compression	500
Concrete in shear in beams	60
Adhesion* of concrete to metal ...	100
Steel in tension	15,000 to 17,000

When the proportions of the concrete differ from those stated above, the stress in compression allowed in beams may be taken at one-fourth, and that in columns at one-fifth of the crushing stress of cubes of the concrete of sufficient size at twenty-eight days after gauging. If stronger steel is used than that stated above, the allowable tensile stress may be taken at one-half the stress at the yield point of the steel.

Approximate Calculations.

Let b be the width and d the effective depth of the beam in inches.

$A = bd$ the area of cross-section.

$m = E_s/E_c$ the ratio of the co-efficients of elasticity of steel and concrete.

M = bending moment at the section considered, in inch-pound units.

t = tensile stress in metal in lbs. per square inch.

c = comprehensive stress in concrete per square inch.

z = distance of resultant thrust in concrete from compressed edge of beam in inches.

kd = distance of neutral axis from compressed edge in inches.

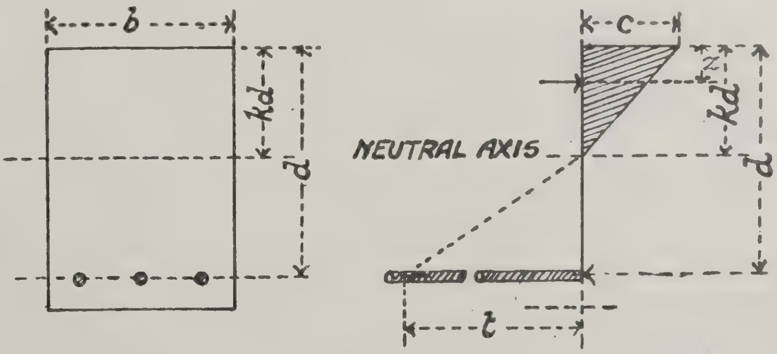
$A_c = kbd$ = area of concrete in compression in square inches.

A_t = area of metal in tension in square inches.

$p = A_t/bd$ the ratio of section of metal to section of concrete.

l = span in inches.

w = load per inch run of span.



		lbs. per sq. in.
Coefficient for concrete	$= E_c =$	2,000,000
„ „ steel	$= E_s =$	30,000,000

$$\frac{E_s}{E_c} = 15.$$

It follows that at any given distance from the neutral axis the stress per square inch on steel will be fifteen times as great as on concrete.

(*a*) *Beams of Rectangular Section with Single Reinforcement.*—In a homogeneous beam the stresses are proportional to the distances from the neutral axis. In a discrete beam, such as a beam of concrete and steel, on account of the greater rigidity of steel, at a given distance from the neutral axis the stress in the steel will be m times as great as in concrete. Hence :—

---

* By accidental load is meant the imposed load additional to the weight of the structure for which the structure is calculated.

* It is desirable that the reinforcing rods should be so designed that the adhesion is sufficient to resist the shear between the metal and concrete. Precautions should in every case be taken by splitting or bending the rod ends, or otherwise, to provide additional security against the sliding of the rods in the concrete.

$$\frac{mc}{t}=\frac{kd}{d(1-k)}=\frac{k}{1-k}.$$

But equating the total tension and compression

$$\tfrac{1}{2}\,cbkd=pbdt$$
$$ck=2\,pt.$$

Replacing c in terms of t

$$\frac{k^2}{m(1-k)}=2\,p$$
$$k=\sqrt{(p^2m^2+2pm)}-pm.$$

Thus for

$m=$	$p=$	$k=$
15	·007	·365
15	·010	·417
15	·015	·483
15	·020	·530

That is, the neutral axis is lower as the amount of reinforcement is greater, and passes the half depth for 2 per cent. of reinforcement.

The distance of the resultant thrust from the compressed edge is :—

$$z=\tfrac{1}{3}kd$$

Equating the moments of resistance to the bending moment,

$$\mathrm{M}=\mathrm{A}_t t(d-\tfrac{1}{3}kd)=\tfrac{1}{2}\mathrm{A}_c c(d-\tfrac{1}{3}kd)$$
$$t=\frac{\mathrm{M}}{\mathrm{A}_t d(1-\frac{1}{3}k)}=\frac{\mathrm{M}}{pbd^2(1-\frac{1}{3}k)}$$
$$c=\frac{2\mathrm{M}}{\mathrm{A}_c d(1-\frac{1}{3}k)}=\frac{2\mathrm{M}}{kbd^2(1-\frac{1}{3}k)}.$$

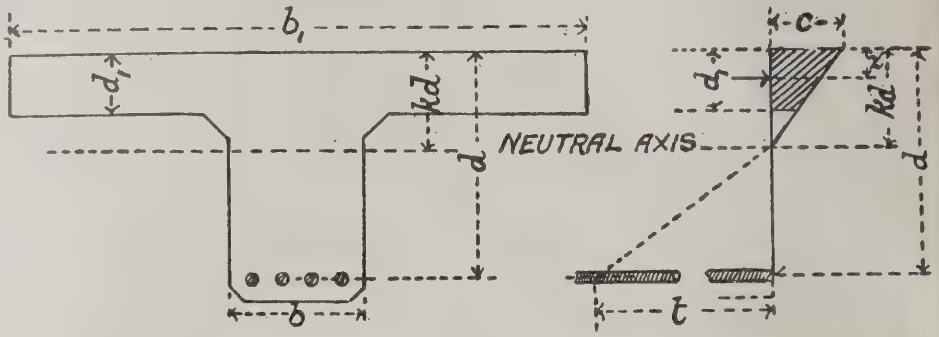
The shearing stresses and tensions near the ends of the beam are usually resisted by stirrups or inclined steel bars, and it is always desirable to bend upwards near the supports one or more of the reinforcing bars when the reduced bending moments at the ends permit of so doing. Stirrups or rigidly attached web members or inclined bars should be provided in all cases where the average shearing stress on a vertical section of the beam exceeds 60lbs. per square inch of the section. A theoretical determination of the section required for these would be very difficult. If the simple case is taken of a uniformly loaded beam, supported at the ends with horizontal steel tension bars not bent up at the ends, the adhesion between concrete and steel which is required may be found thus: The difference of tension in 1-foot lengths of bars at the end of the span will be the tangential force between steel and concrete in that distance. The bending moment at the end is 0, and at one foot from the end 6w(l—12) inch-pounds, where w is the load per inch run. Hence the increment of tension between the end and 1ft. from the end is

$$\frac{6w(l-12)}{d(1-\frac{1}{3}k)}\text{ lbs.}$$

If ψ is the total perimeter of the reinforcing bars, the adhesion stress is

$$\frac{w(l-12)}{2\psi d(1-\frac{1}{3}k)}\text{ lbs. per sq. in.}$$

(*b*) *Beams of* **T** *Section with Single Reinforcement.*— In designing **T** beams where the upper flange forms a floor, the thickness d_1 of this will first be ascertained by considering the part between two ribs as a slab, having its own reinforcing bars transverse to the rib. The whole of this cannot in general be considered to form part of the upper flanges of the **T** beams. The width b_1 of the upper flange may be assumed to be not greater than one-third the span of the beams, or than three-fourths of the distance from centre to centre of the reinforced ribs.* The depth d should then be determined with reference to the stiffness required in the floor. In general d is from $\frac{1}{12}$th to $\frac{1}{18}$th of the span.



Two cases arise according as the thickness of flange is greater or less than kd, the distance from the neutral axis to the compressed edge. In the former case ($d_1>kd$) the rules under (a) apply if b_1 is substituted for b, and $\mathrm{A}=b_1d_1+b(d-d_1)$ for bd. The equations then become

$$\frac{mc}{t}=\frac{k}{l-k}$$
$$k=\sqrt{\left(\frac{2p\mathrm{A}m}{b_1d}+\frac{p^2\mathrm{A}^2m^2}{b_1^2d^2}\right)}-\frac{p\mathrm{A}m}{b_1d}$$
$$=\sqrt{\left(\frac{2\mathrm{A}_tm}{b_1d}+\frac{\mathrm{A}_t^2m^2}{b_1^2d_1^2}\right)}-\frac{\mathrm{A}_tm}{b_1d}$$
$$z=\tfrac{1}{3}kd$$
$$t=\frac{\mathrm{M}}{\mathrm{A}_t d(1-\frac{1}{3}k)}=\frac{\mathrm{M}}{p\mathrm{A}d(1-\frac{1}{3}k)}$$
$$c=\frac{2\mathrm{M}}{\mathrm{A}_c d(1-\frac{1}{3}k)}=\frac{2\mathrm{M}}{kb_1d^2(1-\frac{1}{3}k)}$$

where $p\mathrm{A}=\mathrm{A}_t$ the section of reinforcement. The increment of tension in one foot length at the end of the beam and the adhesion stress is the same as in (a).

When d_1 is less than kd the small compression in the web between d_1 and kd may be neglected.

Let, as before, the whole area of section $=\mathrm{A}=b_1d_1+b(d-d_1)$, and $p\mathrm{A}$ be the area of reinforcement.

$$\frac{mc}{t}=\frac{k}{1-k}$$

The mean compressive stress on the flange is

$$\tfrac{1}{2}\left\{c+c\frac{kd-d_1}{kd}\right\}=\frac{c}{2}\cdot\frac{2kd-d_1}{kd}.$$

Equating the total tension and compression,

$$\mathrm{A}_t t=p\mathrm{A}t=\tfrac{1}{2}b_1d_1c\frac{2kd-d_1}{kd}$$
$$kd=\frac{b_1d_1^2+2p\mathrm{A}md}{2b_1d_1+2p\mathrm{A}m}=\frac{b_1d_1^2+2\mathrm{A}_tmd}{2b_1d_1+2\mathrm{A}_tm}.$$

But $z=\dfrac{d_1}{3}\cdot\dfrac{3kd-2d_1}{2kd-d_1}$.

Equating the moments

$$\mathrm{M}=\mathrm{A}_t t(d-z)=p\mathrm{A}t(d-z)$$
$$=\tfrac{1}{2}b_1d_1c\,\frac{2kd-d_1}{kd}\,(d-z)$$
$$t=\frac{\mathrm{M}}{p\mathrm{A}(d-z)}$$
$$c=\frac{2\mathrm{M}kd}{b_1d_1(2kd-d_1)(d-z)}.$$

It may be useful also to point out that the area of reinforcement for a given value of c/t is

$$\mathrm{A}_t=p\mathrm{A}=\frac{c}{t}\cdot\frac{b_1d_1(2kd-d_1)}{2kd}.$$

(*c*) *Slabs Supported or Fixed on more than Two Sides.*—It does not appear that there is either a satisfactory theory or trustworthy experiments from which the strength of rectangular slabs supported or fixed on all four edges can be determined.

(See appendices for a statement of some rules which have been used in determining the strength of slabs.)

Columns or Pieces subjected to Thrust.

The reinforcement of columns should in general amount to at least 0·8 per cent. of the gross cross-section. The liability to bending of the longitudinal reinforcing bars greatly weakens the column, and should be prevented by steel binding bars. Some theoretical considerations would indicate that cross binding is required at points not further apart than twenty-four times the least lateral dimension of the reinforcing rods. But experiment shows that still closer cross binding, or better, spiral binding,* greatly increases the strength of the column.

(*a*) *Short Columns Axially Loaded.*—If the load is strictly axial the stress is uniform on cross-sections. Let A_c be the cross-section of the column (including the reinforcement), and A the equivalent section as defined below, a the section of longitudinal reinforcing bars, P the load on the columns in pounds. Let c be the stress of the concrete, and t that on the steel, the ratio of the co-efficients of elasticity being m.

$$c=\frac{\mathrm{P}}{\mathrm{A}_c+(m-1)a}=\frac{\mathrm{P}}{\mathrm{A}}$$
$$t=\frac{m\mathrm{P}}{\mathrm{A}_c+(m-1)a}=\frac{m\mathrm{P}}{\mathrm{A}}$$

It appears that c may be taken=500lbs. per sq. in., t=7,500lbs. per sq. in., and $\mathrm{E}_s/\mathrm{E}_c=m=15$.

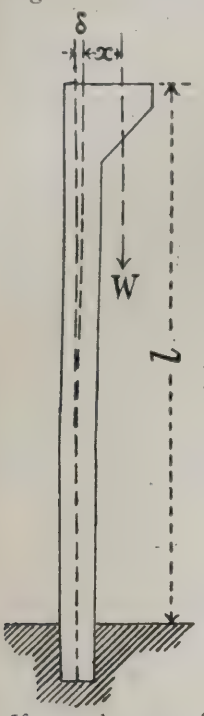
When the stress on the concrete is not greater than 500lbs. per sq. in., lateral bending of the column as a whole is not to be feared if the ratio of length to the least lateral dimension is not greater than 18.

(*b*) *Columns Eccentrically Loaded.*—If a column initially straight is loaded eccentrically, as when a beam rests on a bracket attached to the column, it may be regarded as fixed at the base and free at the loaded end. Then it must bend in the plane passing through the load, the deflection at the top being δ. Let x be the eccentricity of the load measured from the centre of the column when straight. Then the bending moment at the base of the column is W $(\delta+x)$. But it is known that δ will be small compared with x, provided that W is small compared with $2EI/l^2$, and this will be the case in such conditions as are likely to occur in designing concrete columns. Then the bending moment may be taken as Wx, and the stress at the base of the column, treating it as homogeneous, will be:—

---

* There is no satisfactory theoretical determination of the precise amount of the floor slab acting with the web.

* M. Considère recommends that the distance between the coils of the spiral should not exceed from $\frac{1}{10}$th to $\frac{1}{7}$th of the diameter of the spiral. In the case of piles subjected to longitudinal shock in driving there are special reasons for decreasing the distance between the cross binding near the ends.



$$f=W\left\{\frac{1}{A}\pm\frac{x}{Z}\right\}$$

very nearly, where A is the whole section of the column, and Z the modulus of the section relatively to an axis through the centre of gravity and at right angles to the plane of bending.

In dealing with reinforced columns which are not homogeneous, it is convenient to substitute for the actual section of the column what may be termed the equivalent section, or section of concrete equivalent in resistance to the actual column. If A_c is the area of section of the column (including the area of reinforcement), and a is the area of reinforcement, then the equivalent section is:—

$$A=A_c+(m-1)a.$$

If h is the depth of the section in the plane of bending, the moment of inertia relatively to the neutral axis can be expressed

in the form $I=nAh^2$, and the section modulus in the form $Z=\frac{1}{2}nAh$. (See Appendix III.)

It is desirable in columns that there should be no tension, and generally when the vertical load is considerable there is none. Cases in which the eccentricity is so great that there is tension must be treated by the methods applicable to beams if it is made a condition that the steel carries all the tension. In the following cases it is assumed that there is no tension.

Case I.—Column of Circular Section, Reinforced Symmetrically to the Neutral Axis.—Let m be the ratio E_s/E_c of the coefficients of elasticity of steel and concrete, A_c the cross-section of the column in square inches, a the area of reinforcement in square inches, h the diameter of the column, h_t the distance between the reinforcing bars perpendicular to the neutral axis. Then the equivalent section is

$$A=A_c+(m-1)a$$

and the modulus of the section is (Appendix III.)

$$Z=\tfrac{1}{8}A_c h+\tfrac{1}{2}(m-1)a\frac{h_t^2}{h}.$$

The stress at the edges of the section can then be calculated by the general equation

$$f=W\left\{\frac{1}{A}\pm\frac{x}{Z}\right\}$$

where x is the eccentricity of the load in inches and W the load in pounds. The greater value of f must not exceed the safe stress stated above.

Case II.—Rectangular Section with Reinforcement Symmetrical to the Neutral Axis.—Using the same notation as in the last case, h being now the depth of the section in the plane of bending, the section modulus is (Appendix III.)

$$Z=\tfrac{1}{6}A_c h+\tfrac{1}{2}(m-1)a\frac{h_t^2}{h},$$

and the stresses are given by the same equation as in the previous case.

Case III.—Column of Circular Section with Reinforcing Bars arranged in a Circle.—Using the same notation as in Case I., h_t being the diameter of the circle of reinforcing bars, the section modulus is (Appendix III.).

$$Z=\tfrac{1}{8}A_c h+\tfrac{1}{16}(m-1)a\,\frac{h_t^2}{h},$$

and the stresses are given by the same equation as in Case I.

(*c*) *Long Columns Axially Loaded.*—For columns more than 18 diameters in length there is risk of lateral buckling of the column as a whole. The strength of such columns would be best calculated by Gordon's formula, but there are no experiments on long columns by which to test the values of the constants for a concrete or concrete and steel column. There does not seem, however, to be any probability of serious error if the total load is reduced in a proportion inferred from Gordon's formula to allow for the risk of buckling.

Let, as before, A_c = the section of the column in inches; a = the area of reinforcement. Then $A=A_c+(m-1)a$ is the equivalent section. Let n be the constant in the equation, $I=nAh^2$ (Appendix III.), and h the least transverse dimension of the column.

Then for a column fixed in direction at both ends, Gordon's formula is

$$\frac{W}{Af}=\frac{1}{1+\frac{l^2}{cnh^2}}=\frac{1}{1+K}$$

so that the column will carry less than a short column of the same dimensions in the ratio of $1+K$ to 1, or, in other words the column will be safe if calculated as a short column, not for the actual load W, but for a load $(1+K)$ W.

The constant c has not been determined experimentally for reinforced long columns. But its probable value is—

$$c=\frac{4\pi^2E_c}{f}$$

where f is the ultimate crushing stress. Putting $E_c=2{,}000{,}000$ and $f=2{,}500$, then $c=32{,}000$. Looking at the well-understood uncertainty of the rules for long columns, very exact calculation is useless. Some values of n for ordinary types of column are given in Appendix III. Taking these values, the following are the values of $1+K$:—

Values of $1+K$.

	Case 1.	Case 2.	Case 3.
$\frac{l}{h}$	$n=0{\cdot}098$	$n=0{\cdot}075$	$n=0{\cdot}0646$
20	1·13	1·17	1·19
25	1·20	1·26	1·30
30	1·29	1·38	1·44

The differences of $1+K$ for considerable differences of n are not very great. In any case n can be found by the method in the appendix with little trouble.

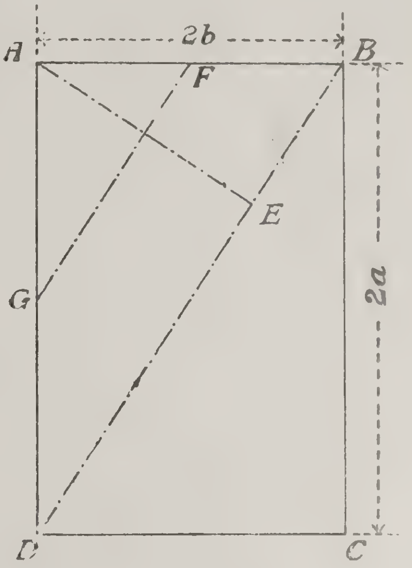
In the case of columns fixed at one end and rounded or unfixed at the other, 2K must be substituted for K. If the column is rounded at both ends, 4K must be substituted for K.

APPENDIX I.

Bach's Theory of the Resistance of Flat Slabs supported on all Edges and Uniformly Loaded.

By W. C. Unwin.

The experiments of Professor Bach show that a flat square slab supported all round fractures along a diagonal, and the greatest stress is therefore on the diagonal section. It is the same apparently with rectangular slabs, though the evidence is not quite so clear. But if a diagonal fracture is assumed a very simple theory gives the stress.



Let the figure represent a rectangular slab with sides $2a$ and $2b$ in inches. Let the diagonal BD $=d$; the thickness of the slab $=h$; the perpendicular on the diagonal AE $=c$; draw FG bisecting the sides, and let p be the load per square inch. Consider the left-hand half of the rectangle. The total load on it is $2pab$, acting at the centre of gravity of ABD, or at $c/3$ from the diagonal. Whatever the distribution of the reactions of the supports, from symmetry, the reaction on AB must act at the centre F of AB, and the reaction on AD must act at the centre G of AD. Hence the resultant of the reactions on AB, AD $=2pab$ must act at some point on the line FG, or at a distance $c/2$ from the diagonal. Hence the bending moment on the diagonal section is

$$M=2pab\left(\frac{c}{2}-\frac{c}{3}\right)=\frac{pabc}{3},$$

the stress at the diagonal section is

$$f=\frac{6M}{dh^2}=2p\frac{abc}{dh^2}.$$

But $cd=4ab$,

$$d^2=4a^2+4b^2,$$

$$f=2p\frac{a^2}{a^2+b^2}\frac{b^2}{h^2}$$

The following form of the equation is convenient:—

$$f=\tfrac{1}{2}\frac{\left(\frac{a}{b}\right)^2}{\left\{1+\left(\frac{a}{b}\right)^2\right\}\frac{a}{b}}\;\frac{W}{h^2}$$

Where w is the total load on the slab:

$\frac{a}{b}$ =	f=
1	$0·25 \frac{W}{h^2}$
1·5	$0·23 \frac{W}{h^2}$
2	$0·20 \frac{W}{h}$

It would seem that if Bach's formula is to be used in calculating slabs, the reinforcing rods should be perpendicular to the diagonals of the rectangle.

APPENDIX II.

Comparison of the Results given by various rules for the Strength flat Rectangular Slabs supported on all Edges and Uniformly Loaded.

By William Dunn.

The theories of Professor Grashof and of Professor Rankine assume that the maximum bending stress on the slab is at the centre, where there are two principal stresses on planes normal to each other, these planes coinciding with the major and minor axes of the slab.

The stress on the plane formed by the major axis of the slab (which is the greater of the two principal stresses) may be found in a simple manner as follows:—

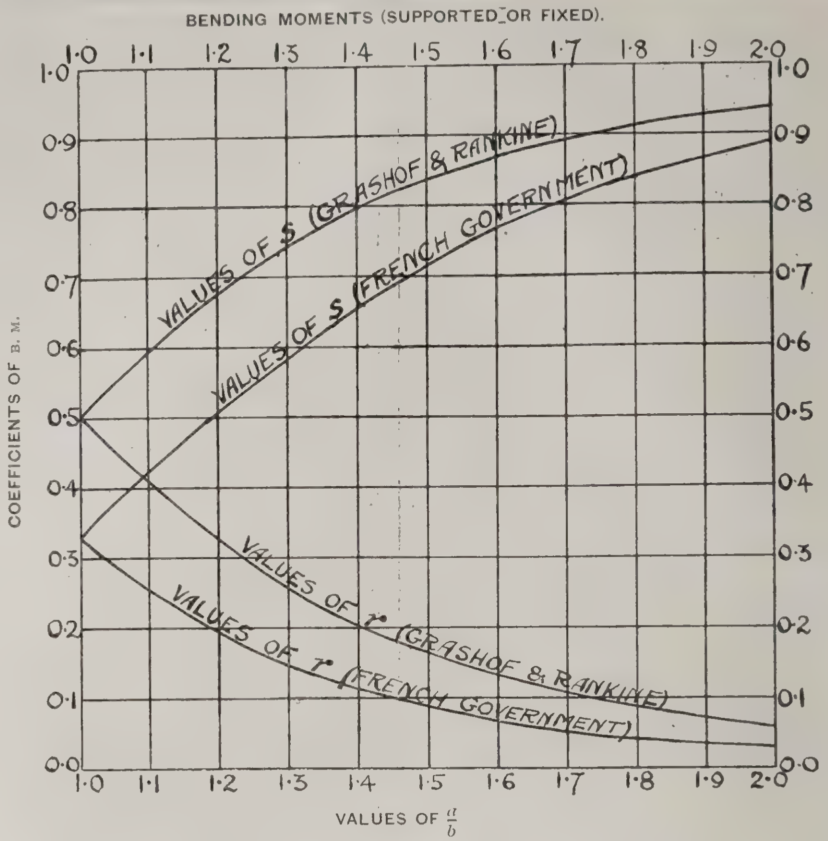
Let the length of the slab $= a$, and the breadth $= b$ (where a is equal to or greater than b).

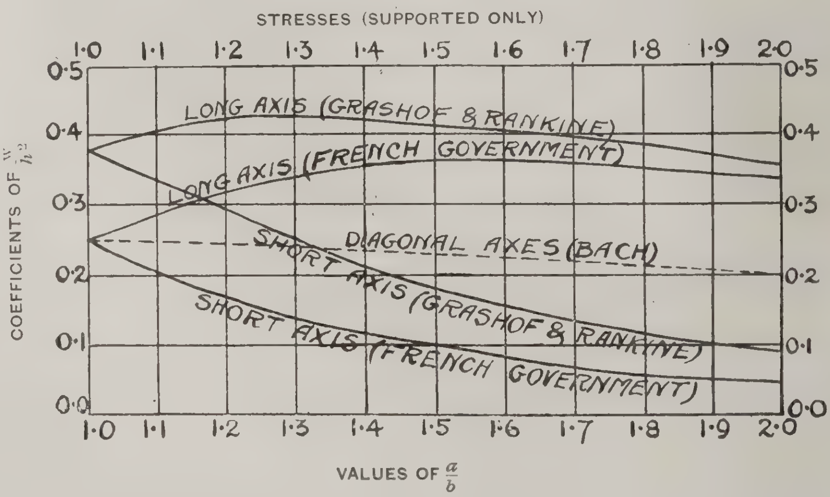
Calculate the bending moment on the slab (disregarding the end supports) as a beam supported or fixed at the sides only, of a span b under the total load on the slab. Multiply this bending moment by the factor s in the following table, to allow for the effect of the end supports. The result is the actual bending moment on the long axis of the slab (*see table below*).

The stress on the section formed by the long axis of the slab is found in the usual way by equating this actual bending moment to the moment of resistance of that section.

Similarly the stress on the plane formed by the minor axis of the slab is found by assuming the slab supported or fixed at the ends (disregarding the effect of the side supports), calculating the bending moment as if the slab were a beam of span a under the total load on the slab. Reduce the bending moment so found by the factor r in the table below, and the result is the actual bending moment on the short axis of the slab.

The stress on the section formed by that axis is found as before by equating this moment to the moment of resistance of that section.





The reasoning by which we find the factors s and r is not entirely satisfactory, and other writers give other values. In the Instructions issued by the French Government to the Ingénieurs des Ponts et Chaussées with the Report of the Ministerial Commission du Ciment Armé, the factors adopted give a greater importance to the effects of the third and fourth supports. The values of s and r, according to that report, are also given in the table herewith.

The maximum stresses on the sections as found by the foregoing rules when the slab is supported but not fixed all round are given in the second table, w being the total load uniformly distributed over the slab, h its thickness, and f the maximum stress due to bending.

These results may be more readily compared by the diagram given above.

It is implicitly assumed in the foregoing that the strength to resist bending is the same in both directions, so that the reinforcements longitudinal and transverse should be of equal area, and at the same depth from the compressed face; they should be placed parallel to the ends and sides.

The stresses found by Bach's formula are also plotted on the diagram.

When	Grashof's and Rankine's Rule		French Government Rule	
$\frac{a}{b}$=	$s=\frac{a^4}{a^4+b^4}$	$r=\frac{b^4}{a^4+b^4}$	$s=\frac{1}{1+2\frac{b^4}{a^4}}$	$r=\frac{1}{1+2\frac{a^4}{b^4}}$
1·0	0·50	0·50	0·33	0·33
1·5	0·83	0·16	0·71	0·09
2·0	0·94	0·05	0·89	0·03

When $\frac{a}{b}$=	Values of f according to Grashof and Rankine.		Values of f according to French Government Rule.	
	On Long Axis.	On Short Axis.	On Long Axis.	On Short Axis.
1·0	$0·375 \frac{W}{h^2}$	$0·375 \frac{W}{h^2}$	$0·250 \frac{W}{h^2}$	$0·250 \frac{W}{h^2}$
1·5	$0·416 \frac{W}{h^2}$	$0·183 \frac{W}{h^2}$	$0·361 \frac{W}{h^2}$	$0·101 \frac{W}{h^2}$
2·0	$0·352 \frac{W}{h^2}$	$0·088 \frac{W}{h^2}$	$0·333 \frac{W}{h^2}$	$0·045 \frac{W}{h^2}$

APPENDIX III.

The Moment of Inertia of Sections of Reinforced Concrete.

By W. C. Unwin.

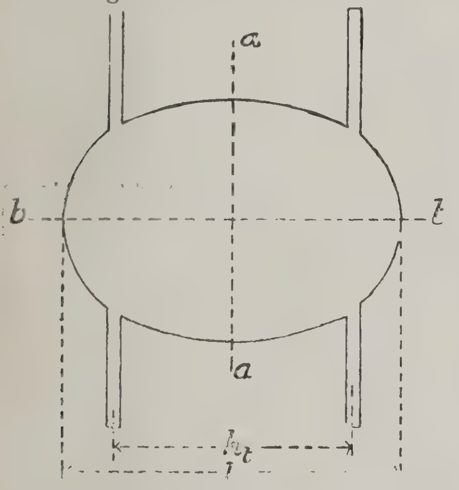
If m is the ratio E_s/E_c of the coefficients of elasticity of steel and concrete, then an area of A_t of steel is equivalent in resistance to mA_t of concrete. If A_c is the area of a section (including the area of reinforcing bars), and a the area of the reinforcing bars, then the section is equivalent to a section of area $A=A_c+(m-1)\,a$ of concrete only. This will be called the equivalent section.

The moment of inertia of a section about its neutral axis can always be put in the form,

$$I=nAh^2,$$

where h is the depth at right angles to the neutral axis, and n is a constant depending on the form of the section. Thus, for a rectangular section $I=\frac{1}{12}Ah^2$, and for a circular section $I=\frac{1}{16}Ah^2$.

In dealing with reinforced sections, it is convenient in many cases to express the moment of inertia in terms of the equivalent area. The equivalent area is found by adding to the actual area of the section portions of a total area $(m-1)\,a$ at the same distance from the neutral axis as the reinforcing bars.



The figure shows a section for which $b\,b$ is the plane of bending, and $a\,a$ the neutral axis passing through the centre of gravity of the section. The reinforcing bars are supposed symmetrical to the neutral axis. The projecting parts of total area $(m-1)\,a$ are the concrete areas equivalent to the steel. If I_c is the moment of inertia of the section without reinforcing bars, the moment of inertia with reinforcing bars is

$$I=I_c+\tfrac{1}{4}(m-1)ah_t^2.$$

Thus, for a rectangular section

$$I=\tfrac{1}{12}A_ch^2+\tfrac{1}{4}(m-1)ah_t^2,$$

and the modulus of the section is

$$Z=\tfrac{1}{6}A_ch+\tfrac{1}{2}(m-1)a\frac{h_t^2}{h}.$$

For a circular section

$$I=\tfrac{1}{16}A_ch^2+\tfrac{1}{4}(m-1)ah_t^2,$$

and the section modulus is

$$Z=\tfrac{1}{8}A_ch+\tfrac{1}{2}(m-1)a\frac{h_t^2}{h}.$$

Example 1.—Rectangular Section.—Let $m=15$, $a=0{\cdot}01A_c$, and $h_t=0{\cdot}9h$. The equivalent area is $A=A_c+(m-1)a=A_c+14A_t=1{\cdot}14A_c$.

$$I=\tfrac{1}{12}A_ch^2+\frac{14\times0{\cdot}81}{4\times100}A_ch^2$$
$$=0{\cdot}1117A_ch^2;$$

but $A_c=0{\cdot}877A$,

$$I=0{\cdot}098Ah^2,$$
$$Z=0{\cdot}196Ah.$$

In this case in the general expression $I=nAh^2$, $n=0{\cdot}098$, when A is the equivalent section.

Example 2.—Circular Section.—Let $m=15$, $a=001\,A_c$, and $h_t=0{\cdot}8h$. The area of the equivalent section is $1{\cdot}14A_c$, as before.

$$I=\tfrac{1}{16}A_ch^2+\tfrac{1}{4}\times14\times{\cdot}01A_c\times{\cdot}64h^2=0{\cdot}0849A_ch^2$$

But $A_c=0{\cdot}877A$.

$$I=0{\cdot}0745Ah^2.$$
$$Z=0{\cdot}149Ah.$$

Example 3.—Circular Section with reinforcing bars arranged in a Circle.—The reinforcing bars are nearly equivalent to a ring of steel of the same total area. Let $m=15$, $a=0{\cdot}01\,A_c$, and let the diameter of the circle of reinforcing bars be $h_t=0.8h$. The equivalent section is $A=1{\cdot}14A_c$, as before.

$$I=\tfrac{1}{16}A_ch^2+\frac{m-1}{8}ah_t^2$$
$$=0{\cdot}0625A_ch^2+1{\cdot}75\times{\cdot}01A_c\times{\cdot}64h^2$$
$$=0{\cdot}0737A_ch^2$$
$$=0{\cdot}0646Ah^2$$
$$Z=0{\cdot}1292Ah$$

It will be seen that if the value of n in the equation $I=nAh^2$ for simple circular and rectangular sections, and the reinforced sections are compared, the results are as follows:—

	Simple sections.	Reinforced sections.
Case I.	$\frac{1}{12}=0{\cdot}0833$	0·098
Case II.	$\frac{1}{16}=0{\cdot}0625$	0·0745
Case III.	$\frac{1}{16}=0{\cdot}0625$	0·0646

The differences are not very great, so that while the value of n can always be found exactly when necessary for any proportion of reinforcement, there are cases such as that of columns where the value of n does not much affect the result, and where, from the nature of the calculation, great accuracy is impossible—for which a value of n can be assumed without any practically important error.

APPENDIX IV.

Value of E_s/E_c.

By William Dunn.

In the foregoing recommendations, as in the Prussian Government and various other foreign rules, the value of E_s/E_c for concrete of the kind usually employed, of hard stone or gravel mixed 1 : 2 : 4, is put at 15.

In reality, it varies with the age of the concrete, the proportions and nature of the materials, the stress at which it is taken, &c. As determined from tests of full-sized columns of concrete, with longitudinal reinforcement only and without transverse binding, it varied from a maximum of 10 at working loads to 15 to 21 at ultimate loads. For cinder concrete of 1 : 2 : 4 or 1 : 3 : 6 it varied from about 12 at working loads to 26 to 48 at ultimate loads.

This factor E_s/E_c is employed to determine the position of the neutral axis in beams, and it is found that while a variation between 10 and 15 makes no very great difference in the result, a value of 15 fixes the position of that axis nearest to the position found by experiment in singly reinforced beams. In fact, the formula given herein for the position of the neutral axis with $E_s/E_c=15$ gives a result which agrees well with observed values in beam tests.

As mentioned above, it does not agree so well with the tests on columns; it gives too great an importance to the metal reinforcements, which becomes more noticeable when the percentage of reinforcement is considerable. But these tests were made on columns with longitudinal reinforcement only and without transverse binding, which latter adds greatly to the strength. This binding is explicitly required in the Prusian Government and other proposals where E_s/E_c is taken at 15; and that figure may bk taken as making allowance in some degree for it.

We have no satisfactory determination of the increase in strength due to the transverse reinforcement, whether in single bindings or a continuous spiral.

In the report of the French Commission du Ciment Armé, art. 5, it is stated that where the concrete has spiral binding or transverse or oblique reinforcements, so disposed as to resist swelling under thrust, the safe loads may be increased in some measure, but not in any case to more than $\frac{6}{10}$ of the crushing strength as determined from tests on cubes of 20 *cm.* sides at the age of 90 days.

In the explanatory circular accompanying that report (p. 6), the value to be given to E_s/E_c is discussed, and its theoretic value is put at about 10. It is stated, however, that it is preferable to regard that coefficient as the result of experiences on pieces with longitudinal and transverse reinforcements, and not as representing the ratios found from concrete and metal separately. It is to be taken as varying from 8 when the longitudinal reinforcements have a diameter equal to $\frac{1}{10}$ of the least dimension of the piece and the bindings are spaced at a distance equal to that least dimension in the direction of the length; up to 15 when the longitudinal bars are $\frac{1}{20}$ of the least dimension and the bindings are spaced one-third of that distance apart. In both cases the bindings are to be near the outer face of the concrete.

Again, on page 4 of the circular, it is stated that it is desirable to encourage the proper use of the metal in both longitudinal and transverse directions. While an exact determination of the increase of strength due to the transverse reinforcement would be difficult, the investigations of the Commission du Ciment Armé enables it to be admitted, *faute de mieux*, that it is found by multiplying the resistance to crushing of the concrete by a coefficient

$$1+m'\frac{V'}{V}$$

V' being the volume of the transverse or oblique reinforcement, and V the volume of the concrete, m' being a variable coefficient depending on the efficiency or the union between the longitudinal bars. When the union is made by bindings in the usual way, m' varies from 8 when these bindings are spaced at a distance equal to the least transverse dimension of the piece to 15 when spaced at one-third that dimension.

When spiral binding is used m' varies from 15 to 32, the lower value being taken when the pitch of the spiral is $\frac{2}{5}$ of the least transverse dimension, and the higher when the spacing is $\frac{1}{5}$ of that dimension under a pressure of 50 kilos. per cm^2 or $\frac{1}{8}$ under a pressure of 100 kilos. per cm^2.

In no case should the working stress exceed $\frac{6}{10}$ of the resistance to crushing as determined on cubes, as before mentioned.

Notes and News

New Engineering Laboratories are to be erected at the Heriot-Watt College, Edinburgh, at a cost of about £8,500.

Bristol Society of Architects.—Mr. H. Dare Bryan, F.R.I.B.A., has been elected president of this society for the forthcoming session.

Additions to the Nottingham G. P. O. are being made at a cost of about £5,000, the buildings being continued about 40ft. up Queen Street by absorbing two-thirds of the loading yard.

A new Reredos, constructed of Devonshire-grown oak, has been erected in St. Augustine's Church, Heanton Punchardon, Devon. It is the work of Messrs. Harry Hems & Sons, of Exeter.

"The Art and Craft of Garden Making."—Mr. B. T. Batsford will publish in a few days a new and enlarged edition of this well-known book by Mr. Thomas H. Mawson, the last edition of which was issued in 1901. The new edition will contain numerous fresh illustrations and schemes of gardens.

The Samaritan Hospital, Glasgow.—At a cost of over £12,000 a new wing and additions have been completed at this hospital, which now accommodates 86 beds, and is the largest women's hospital in the United Kingdom. The total cost of the buildings, including the nurses' home and the dispensary, with their equipment and furnishings, has been about £40,000.

Infants' Hospital, Vincent Square, Westminster.—H.R.H. the Duchess of Albany laid the memorial-stone at this new hospital on May 2nd. The elevation of the building is of red facings, with Portland stone dressings. Messrs. Read and Macdonald are the architects, and Messrs. Patman & Fotheringham, Ltd., of Theobald's Road, Holborn, and Park Street, Islington, are the builders.

Extensions to the G.P.O., Cardiff, are to be carried out at a cost of about £20,000. The contract has been secured by Messrs. William King & Co., of Westminster. The extension will be at the south end of the building, overlooking Park Street. The scheme provides for raising the elevation to correspond with the Westgate Street frontage. The work has just been commenced, and is expected to occupy about nine months.

Manchester Royal Eye Hospital Extensions.—The Board of Management of the Manchester Royal Eye Hospital has placed the contract for the superstructure of the extension of the hospital in Oxford Road with Messrs. C. H. Normanton & Co., of Manchester. It is estimated that the entire cost of the work undertaken by the Board will amount to about £23,000. Fifty additional beds for patients will be thus provided, making a total of 160.

A Sheffield Improvement.—A scheme for the laying-out of Fitzalan Square, Sheffield, put forward by the Sheffield Society of Architects and Surveyors, and approved by the City Surveyor (with certain alterations), is to be carried out by the Corporation at an estimated cost of £11,618. It is proposed that the present tramway office and conveniences shall be removed, underground conveniences constructed, and tramway lines, to be used as sidings, substituted for the existing arrangement.

Mr. W. T. Fenton, president of the Sheffield Society of Architects, has been elected a F.R.I.B.A.

A new Library at Mill Hill School has been built at a cost of £2,500 from designs by Messrs. Collcutt and Hamp.

Quantity Surveyors' Fees.—At their last meeting the Belfast Quantity Surveyors' Society decided to reduce their fees for warehouse work from 1½ to 1 per cent.

The new Art Gallery at Brighouse was opened by H.R.H. Princess Louise on Wednesday last. Mr. R. F. Rogerson was the architect.

Manchester Society of Architects.—Mr. Paul Ogden has been elected president of this Society, with Mr. Edward Hewitt and Mr. Percy Scott Worthington as vice-presidents.

The late Mr. James Longden, head of the well-known firm of contractors, Messrs. George Longden & Son, Ltd., Sheffield, who died on March 27th last, left estate which has been proved at £43,680 gross.

A new Catholic Church in Edinburgh.—St. Peter's, Falcon Avenue, Morningside, has just been completed from designs by Mr. R. S. Lorimer, A.R.S.A. The plan is that of a Latin cross, with shallow sanctuary and transept, the nave being flanked by narrow aisles.

Mr. Thomas Rowbotham, the well-known Birmingham contractor, who is now engaged on the erection of the new University buildings at Birmingham, has offered to present the University with a clock and chimes for the tower (estimated to cost about £2,000).

Ormskirk Grammar School is being further extended at a cost of £2,450. The architect for the work is Mr. Frank Rimmington, of Liverpool, and the contractor Mr. James Whittle, of Ormskirk. When completed the school will accommodate 223 students.

The Chartered Surveyors' Golfing Society has been formed, with Mr. George Langridge, president of the Surveyors' Institution, as president. The hon. secretary is Mr. Sydney A. Smith, of 22, Chancery Lane, W.C. The Society is limited to members of the Surveyors' Institution, the annual subscription being 5s.

The Alhambra in Leicester Square has been re-modelled and re-decorated, under the direction of Mr. W. M. Brutton, the Alhambra Co.'s architect. Messrs. G. Aston and Son were the contractors. The structural alterations were requisitioned by the London County Council.

Model Cottage Exhibition, Walker, Newcastle-on-Tyne.—It was anticipated that this exhibition would be opened in July, but, as the making of the main sewer for the exhibition estate to the Tyne might not be completed by the time desired (and for other reasons), it has been decided to postpone the opening of the exhibition till May, 1908.

The Architects' Registration Bill (of the Society of Architects) came before the Hornsey Borough Council recently, when it was decided to request the member for the Hornsey division to endeavour to procure its amendment, if it should be proceeded with in its present form, the Bill appearing "to prevent the employment by local authorities of sanitary inspectors, and possibly also of subordinate officials, in connection with buildings, unless qualified to be registered under the Act."

Mr. George Sanders, F.R.I.B.A., of London, W., died last week. The parish hall of St. Nicholas, Chiswick, was designed by him, and he was also the architect of various schools in the district.

Partnership.—Mr. Ashby W. Warner, A.I.M.E., of Norton, Stockton-on-Tees, has recently been admitted into partnership in the firm of Messrs. A. Haacke & Co., the well-known boiler and pipe coverers, &c. Mr. Warner has acted for 16 years as manager of the firm, in London, Glasgow and West Hartlepool. It is intended to turn the firm into a limited company during the present year, but probably there will be no public issue for the shares.

Messrs. Pinchin, Johnson & Co., Ltd., announce that the increasing popularity of "Minerva" paint, "Satinette" and the other specialities manufactured by them, has made it necessary for the firm to look out for new London offices, as those now occupied by them at 23-25, Billiter Street, E.C., are not nearly large enough for their requirements. Negotiations are now in progress for the acquisition of extensive premises near by—two complete buildings of five floors each—where it is intended to keep a good stock of the different specialities, so that urgent orders can be dispatched direct from the City office instead of from the works at Stratford. A showroom with a permanent exhibit is also contemplated, so that intending users of paints, enamels, &c., will be able to see specimens of work actually done. A telephone, writing materials and accommodation will be at the disposal of visitors, and these little conveniences we are sure will be much appreciated.

IN PARLIAMENT.

(By Our Press Gallery Representative.)

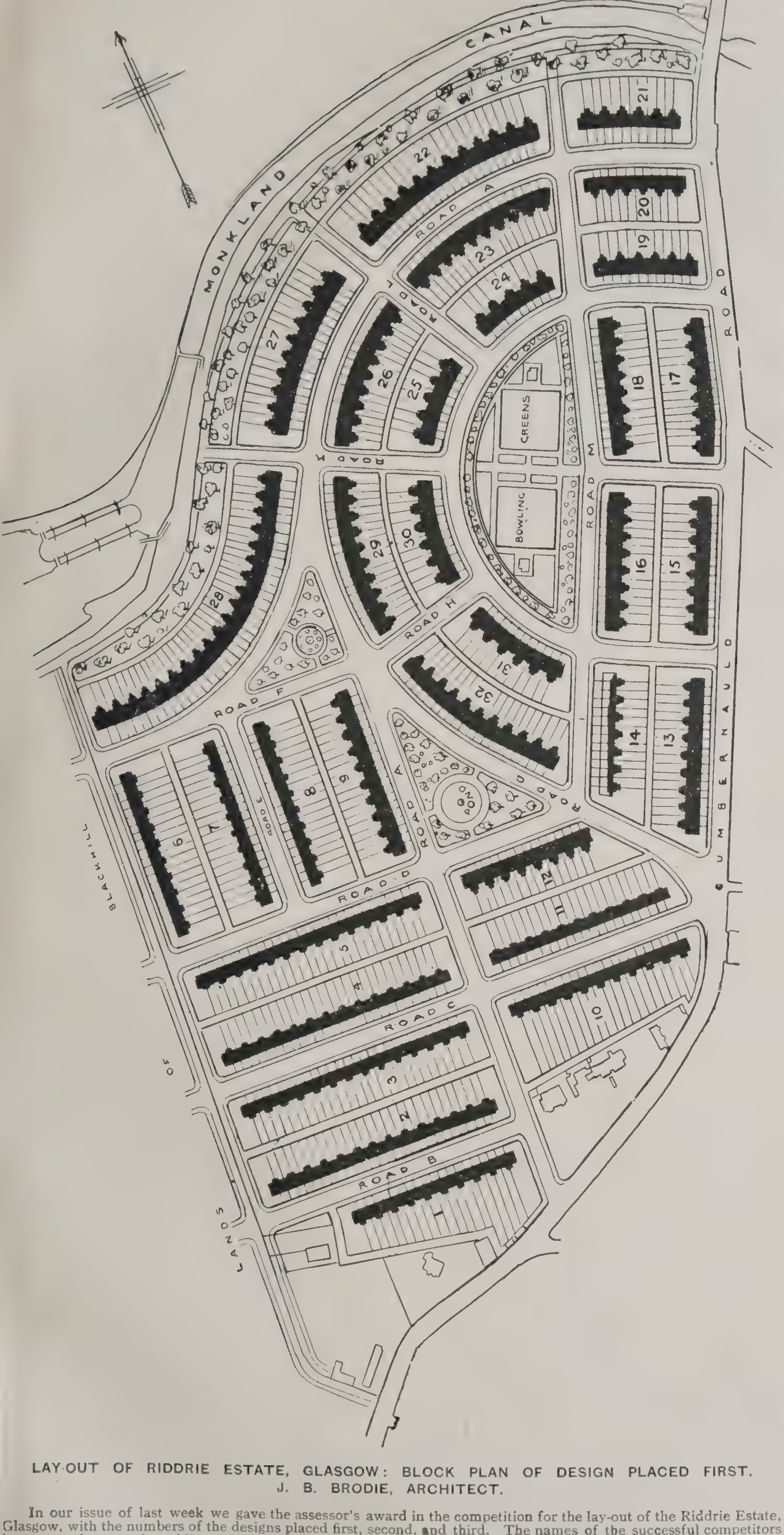
Ancient Monuments in Ireland.

Replying to a question put by Sir Thomas Esmonde in the House of Commons recently, the Secretary to the Treasury (Mr. Runciman) gave a list of the ancient monuments in Ireland vested in the Board of Works. He said the sum of £1,105 had been expended by the Board on the protection and maintenance of such monuments during the year ended March 31st last. Their preservation was one of the duties of the Board's technical staff and was under the particular direction of one of the principal surveyors, who had special qualifications. Every monument in the Board's charge was inspected, as far as possible, at least once in each year, and a report as to its condition was sent to the Board. Also, at the more important monuments there were resident caretakers.

Army Surveyors.

Mr. Godfrey Baring asked the Secretary of State for War whether he was aware that there was a body of civil engineers, architects and surveyors on the Staff of the Army, 58 in number, whose position, pay and prospects had been the subject of three different committees; and whether he could say if, and when, effect would be given to the recommendations of those committees.

In reply, Mr. Haldane said: "These questions presumably refer to the surveyors on the Royal Engineer Civil Staff. A scheme has been for some time under consideration by which the prospects of these gentlemen will be improved; and it is hoped that it will be possible to obtain a final decision at an early date."



LAY-OUT OF RIDDRIE ESTATE, GLASGOW: BLOCK PLAN OF DESIGN PLACED FIRST.
J. B. BRODIE, ARCHITECT.

In our issue of last week we gave the assessor's award in the competition for the lay-out of the Riddrie Estate, Glasgow, with the numbers of the designs placed first, second, and third. The names of the successful competitors have since been made public. They are:—1st (No. 9), Mr. J. B. Brodie; 2nd (No. 45), Mr. John F. Fairweather; 3rd (No. 25), Mr. Richard Henderson—all of Glasgow. For the accompanying illustrations of the design placed first we are indebted to the "Glasgow Evening Citizen." Mr. Brodie's design provides 612 houses. The measurers state that the cost of each class of house would be—three apartments, £275; four apartments, £335: five apartments, £359; or an average of 64·61d. per sq. ft. of floorage area. The City Engineer reported on Mr. Brodie's design as being one of outstanding merit, the block plan being well laid out to suit the contour of the ground. The houses were well planned and so arranged that the frontage of each class of house was of the same width, which allowed them to be set down in any order desired, while the elevations were varied in design and homely in character. At their last meeting the Glasgow Town Council only approved generally of the scheme. At present they do not propose to build the cottages themselves, but to encourage builders to take up the plots.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Dairies and Farm Buildings.

DONCASTER.—SUBSCRIBER writes: "I am about to erect a small model dairy. Should the store-room lead directly from the dairy or from a covered way, and should there be a separate room for the milk separator? Do you think a thatched roof preferable to any other? Are there any good books on this subject and farm buildings?"

As regards dairy planning, we recommend you to consult an article on "The Planning of Dairies," by Mr. Fred J. Francis, in "Specification, No. 9" (price 2s. 6d., or 3s. 3d. post free, from our offices). Two books on the planning of farm buildings are—"Farm Buildings," by Prof. J. Scott (price 2s.), and "Farm Buildings," by A. Dudley Clarke (price 6s.).

Architects in the United States.

P. writes: "Are architects bound to pass an examination before being allowed to practice in the United States? If they are, will the U.S.A. take our English examinations—R.I.B.A. and S.A.?"

In two or three states in America architects are required to have a State diploma obtained by examination, and, so far as we are aware, English examinations are not recognised, but in other States such a diploma is unnecessary.

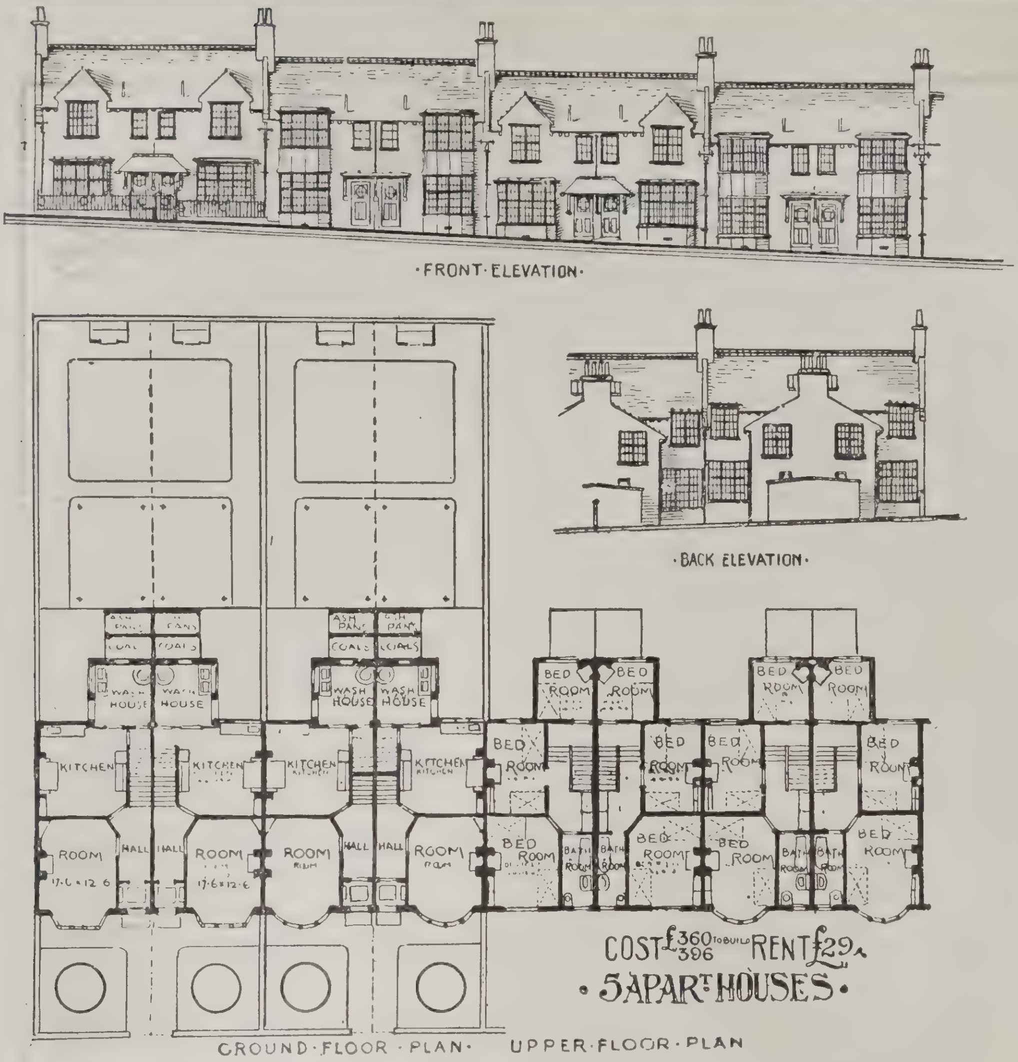
Books on Steelwork and Reinforced Concrete.

LOUGHBOROUGH.—J. H. H. writes: "Please recommend some books on structural steelwork design and practice—not too advanced—and some on reinforced concrete."

For books on structural steelwork the following can be recommended:—"Structural Iron and Steel," by W. N. Twelvetrees (price 6s. 6d.); "Practical Design of Structural Ironwork," by Prof. Henry Adams (price 8s. 6d.); "Skeleton Construction in Buildings," by William H. Birkmire (price 12s. 6d.); and "Constructional Steelwork," by A. W. Farnsworth As regards books on the subject of reinforced concrete, the best is undoubtedly Messrs. Marsh and Dunn's "Reinforced Concrete" (price 21s. 6d.), but smaller books are—"Concrete Steel," by W. N. Twelvetrees (price 8s. 6d.), and Buel and Hill's "Reinforced Concrete Construction" (price 21s. 6d.). These books can be obtained from our offices post free for the prices named.

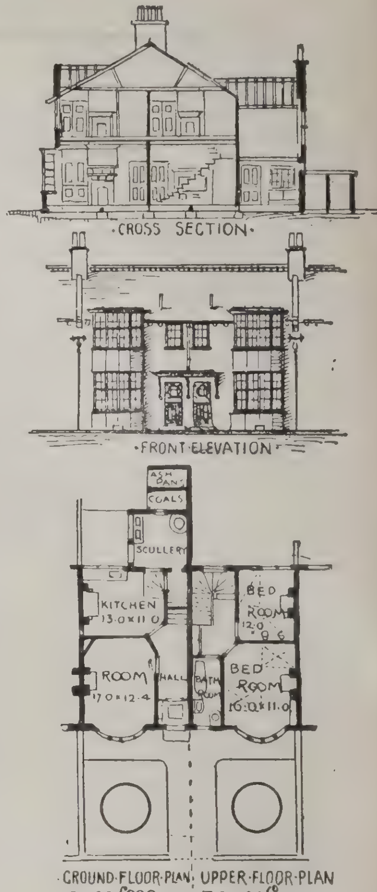
External Cement Rendering.

CEMENT writes: "A good smooth light-buff coloured cement face is required for the exterior of a house. I have specified that it shall be rendered and floated with cement and sand 1 to 3, a small quantity of putty added, and distempered a light buff colour when dry. Can this be improved upon? Is 1 to 3 sufficient? Would it be better to mix ochre with a second coat, or would this be deleterious to the cement? If the cementing be coloured, say, with 'Duresco' I presume it will require recolouring every two or three years. What specification would



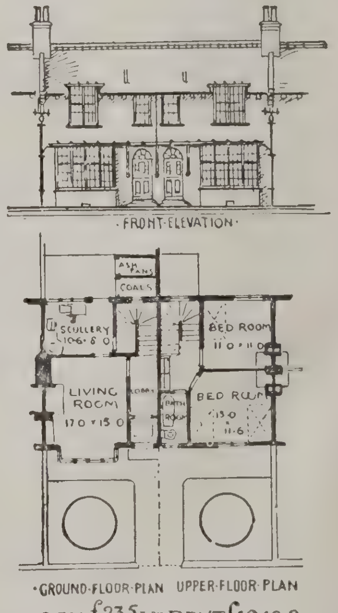
COST £360 TO BUILD 396 RENT £29.

• 5 APART^T HOUSES •



COST £290 TO BUILD 320 RENT £24

• 4 APART^T HOUSES •



COST £235 TO BUILD 265. RENT £19.10.0

• 3 APART^T HOUSES •

Materials used in construction:—Walls: Ground floor, 14-in. brick, Upper floor, 9-in. brick, ¾-in. Cement Plaster Rough-Cast. Floors: Asphalt on Site, Timber Floors, Sculleries in Cement. Roof: Tiles. Foundations: Concrete. Windows: Wood Casements.

APARTMENT HOUSES, RIDDRIE STREET, GLASGOW: DESIGN PLACED FIRST. J. B. BRODIE, ARCHITECT.

you advise? I shall be glad of any information that will assist in obtaining a good cream-coloured durable cemented face."

We do not consider 3 of sand to 1 of cement an adequate proportion for external cement rendering. We think it should be at least 1 to 2. Powdered whiting is usually employed, and is preferable to plasterer's putty. Instead of distempering the finished surface when dry, ochre may be mixed with the rendering to give the desired colour. The small amount that would be required would not be particularly deleterious to the setting. This method has the advantage of not requiring distempering every few years, but, on the other hand, it is not so satisfactory perhaps, as it is inclined to weather streaky and become somewhat bleached. We would recommend, however, the use of ochre mixed with the rendering. If it is desired after a few years to renew the colour, a washable distemper can often be used. It is not necessary to render the surface with two coats. This is more advisable in rough-cast.

Custom Houses.

S. writes: "I shall be glad to know of any work on custom houses, and the planning of same. I want this information in connection with the next Soane Medallion design."

There seems to be no other information on the subject of custom houses other than that contained in a book entitled "Plans, Elevations and Sections of Buildings, Public and Private, executed in various parts of England, &c., including the Custom House, London," by David Laing, F.S.A., architect and surveyor to the Board of Customs. This is rather a rare work, but a copy is to be seen in the reference library of the R.I.B.A. Some photographs of the Custom House at Dublin appeared in the "Architectural Review" last September.

H. Y. M.

Claim for Pumping Water out of Excavation.

ABERGAVENNY—X. X. write: "We shall be glad of your opinion on a small matter in dispute in connection with a church we are building. We claim an extra for pumping water from the excavations for a heating chamber under the church, as nothing is mentioned of pumping or baling in the quantities or the specification. The only item touching on the matter in the specification is: 'Dig all trenches for foundations and excavate for heating vault and under floors as indicated on drawings.' Some months previous to this contract being let, the architect had a trial hole dug on the site, but not to the depth of this heating chamber. This trial hole was dry, hence, we take it, his reason for not including an item for pumping, &c., in specification or quantities."

I fear that you cannot legally claim anything for pumping or baling in this case. Is there not a clause in the "conditions" attached to your contract obliging the contractor to "provide everything necessary for the proper execution of the works," or words to that effect?

F. S. I.

Notes on Competitions

London County Hall.

The correspondence about the London County Hall competition, started by the joint letter from numerous prominent members of the R.I.B.A., still goes on in the Press. In our issue for last week we published a letter from Mr. Thomas A. Pole, A.R.I.B.A. In reply to this Mr. J. S. Gibson, F.R.I.B.A., writes to the "Daily Chronicle" as follows:—"The letter" (Mr. Pole's) "deserves a reply, as some of your readers might regard the airy assertions made therein as serious statement of fact. The letter signed by the members of the R.I.B.A. may be taken as an indication of the fact that a number of architects are justifiably dissatisfied with the conditions of the competition, and the signatures attached to that letter are only a few of many received. . . . . The conditions of the competition have never been discussed by the R.I.B.A., and, therefore, could never have been approved by the Institute. The council of the Institute have, however, endeavoured to get the London County Council to modify the conditions . . . . and that is fairly strong evidence that they do not approve them. Regarding Mr. Riley's position as joint architect, I would suggest that your correspondent should read the conditions, where Mr. Riley's position and powers are clearly set out—a copy may be seen at the Institute. Why the appointment of Mr. Norman Shaw as one of the two assessors should in any way ensure the selection of a fine architectural scheme is beyond my humble comprehension; the whole point of the matter is, the conditions should be framed so as to ensure the submission of fine architectural schemes, and this the London County Council have signally failed to do."

Society of Architects' Travelling Studentship, 1907.

Twenty-three sets of designs were received in this competition, and the Council has awarded the first place to "Mac," Mr. J. Drummond Murdoch, of Edinburgh, and honourable mention to "Celer," Mr. Hubert Savage, of London, N., who receives a special prize from the president (Mr. Albert E. Pridmore).

These designs, and also those submitted in the "Bungalow" competition, are on view this week at the Society's premises in Staple Inn Buildings, Holborn, and subsequently will be exhibited at Devonport and other centres.

Zion Institutional Church, Manchester.

The following ten architects have been invited to submit designs for the above: Messrs. J. W. Beaumont and Son, Bradshaw and Gass, Charles Heathcote and Son, A. Darbyshire and Son, John Gibbons and Son, Edward Hewitt, Potts, Son and Hennings, Edgar Wood and Sellars, Ernest Woodhouse, and G. H. Willoughby. The assessor is Mr. J. S. Gibson, F.R.I.B.A., of London.

Silcoates School, near Wakefield.

From designs submitted by eleven architects invited to compete for the re-building of this school (which was gutted by fire three years ago) the trustees have selected the design of Messrs. Oliver and Dodgshun, of Carlisle and Leeds. Mr. John Ely, F.R.I.B.A., of Manchester, was the assessor. The re-building will cost about £9,000.

Homestead Competition, Rossall.

In connection with the Homesteads and Small Holdings Exhibition to be held at Rossall, Lancs., a first prize of £10 and a second prize of £5 are offered for "plans and specifications showing homestead, including dwelling-house and outbuildings, also scheme of laying-out a 3-acre plot to the best advantage; the cottage to contain not fewer than three bedrooms and to be built in accordance with the by-laws of the Fleetwood Urban District Council, copies of which can be obtained on application to the Estate Office, Fleetwood."

Drawings required: Block plan drawn to a scale of 41.66ft. to 1in. (1/500), showing proposed scheme for laying-out and cultivating the plot, with position of buildings and drains: plans and elevations of all buildings drawn to a scale of 8ft. to 1in., with such sections as may be necessary to explain the character of the buildings, dimensions of timbers, &c.

Specifications to describe the buildings and the character and quality of materials to be used.

Estimate showing cost of homestead and outbuildings and laying-out of plot.

Designs to be of a uniform size, on Double Elephant paper, finished in pen and ink, coloured, and mounted on stretchers, and forwarded to the Estate Office, Fleetwood, not later than February 1st, 1908.

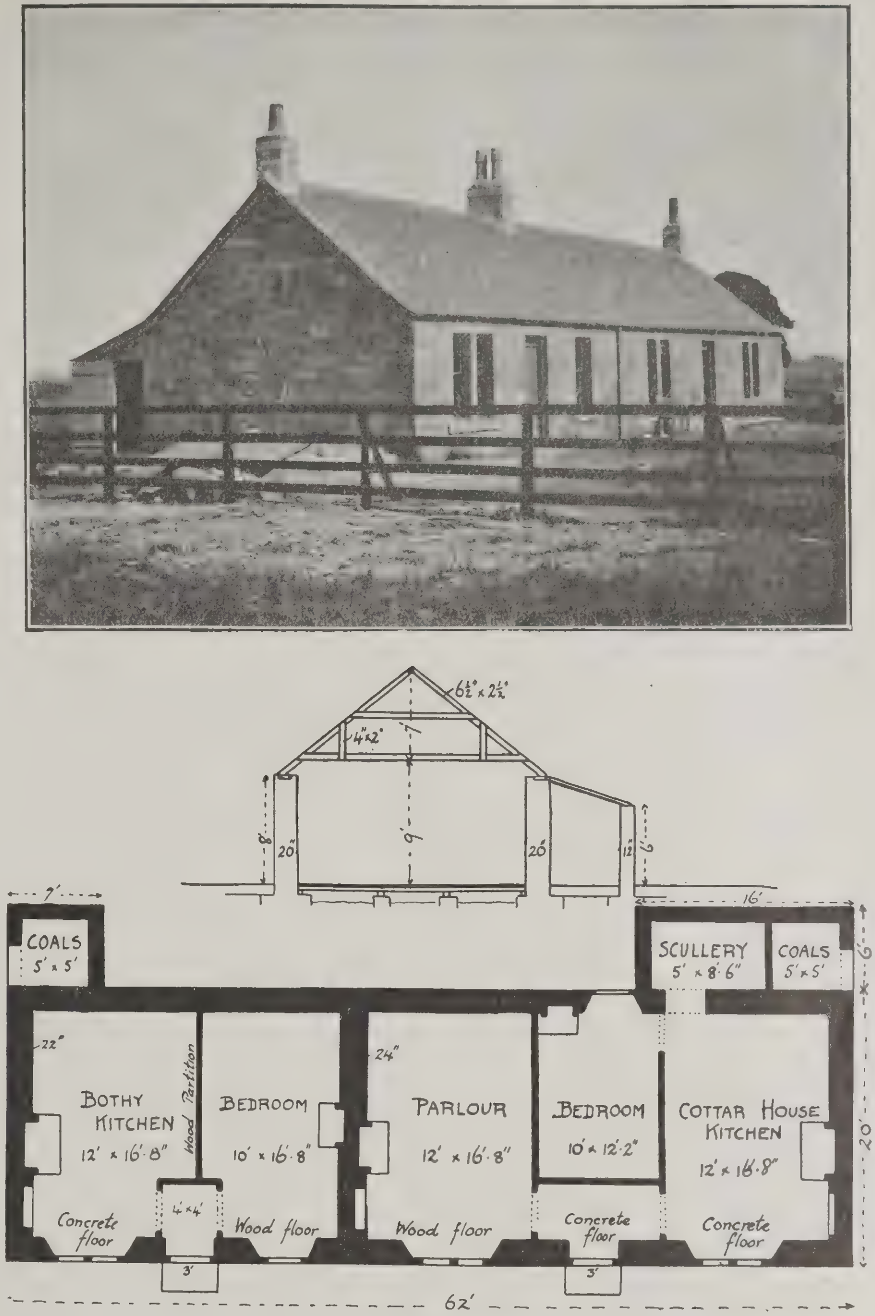
At the close of the exhibition plans will be returned, carriage paid.

A competent and independent assessor will be appointed.

Entrance fee 5/- for each complete scheme entered for competition.

Highland Churches and Manses.

The following are the awards in the competition for proposed churches and manses for the United Free Presbyterian Church:—*Churches:* 1st, Messrs. Greig, Fairburn and Macniven, Edinburgh; 2nd, Mr. Alex. Cullen, Hamilton; 3rd, Messrs. J. W. and J. Laird, Glasgow. Honourable mention: Messrs. Walker and Ramsay, Glasgow; Mr. D. Wishart Galloway, Brechin; Mr. D. W. Robertson, Edinburgh; Mr. W. Carruthers Laidlaw, Edinburgh; Messrs. Clarke and Bell, Glasgow. *Manses:* 1st, Messrs. J. W. and J. Laird, Glasgow; 2nd, Mr. Alex. Cullen, Hamilton; 3rd, Messrs. Clarke and Bell, Glasgow. Honourable mention: Mr. Charles Davidson, Paisley; Mr. H.



COTTAR HOUSE AND BOTHY IN THE HIGHLANDS.

The above photograph and plan are interesting as illustrations of a type of cottage peculiar to the Highlands. The planning especially is unusual. It will be noted that a small lobby is provided to the entrance, presumably with the object of keeping out draughts by means of the double doors. The walls of the cottage are of common rubble work, and, as will be seen from the section, are very substantial. The floors of the kitchens, lobbies, scullery and coal-houses are laid with concrete, and the wood floors in the parlour and bedrooms have a ¾-in. layer of asphalt on a prepared bottom. The roof is covered with dark blue Port Dinorwic slates, with a glazed ridge tile.

Foxall, Carlisle; Messrs. Walker and Ramsay, Glasgow; Messrs. Greig, Fairburn and Macniven, Edinburgh; Mr. Victor D. Horsburgh, Edinburgh; Messrs. J. C. T. Murray and J. A. Minty, London, and Mr. W. Stephen Gibson, Wishaw. It is understood that about 80 churches and 80 manses are to be erected, the cost of the former averaging £1,000 each, and the latter £800 each.

Secondary School, Castleford.

The Governors of the Castleford Secondary School met last week to receive the award of the assessor (Mr. Walter H. Brierley, of York) in the competition for the above, for which 38 sets of designs were received. The first premium was awarded to design No. 36, and the second to design No. 20. Both were considered for some considerable time, and it was finally decided to adopt the design No. 20. The sealed envelopes were afterwards opened, when it was found that the authors of No. 36 were Messrs. Percy Robinson and W. Alban Jones, of Leeds, and the author of No. 20 was Mr. W. S. Braithwaite, of Leeds. It will be noted that the Governors have disregarded the assessor's award in thus adopting the design placed second. Clause 2 of the conditions was as follows: "The Governors have appointed as assessor Mr. Walter H. Brierley, F.S.A., F.R.I.B.A., of York, whose decision, subject to confirmation by the West Riding Education Authority, is to be final." Clause 19 was as follows: "If the Governors determine within twelve calendar months from the date of the award to proceed with the buildings, it is their intention (unless there is some valid reason and subject to the approval of the Board of Education and the West Riding Education Authority) that the author whose design is awarded the first premium shall be employed to carry out the work." In view of the foregoing it can be regarded as nothing less than scandalous that the Board should override the assessor's award and disregard the conditions of the competition: it is a question, indeed, whether they are not legally liable for breach of contract.

Correspondence.

Bishop Auckland School Competition.

To the Editor of The Builders' Journal.

Sir.—My attention has been drawn to various letters in your Journal criticising certain features in my design for the schools at Bishop Auckland. I shall be obliged if you will allow me space to reply.

My anonymous critics have been good enough to effectively answer several of each others' objections, but the unfairness of some of the criticisms can only be fully appreciated by those who are familiar with the conditions of the competition.

Your correspondent "Competitor" complains that my design accommodates four pupils fewer than the required number of 250, and says that the shape of a classroom for 25 is considerably different from that of a classroom for 24. This is obviously correct, and is precisely the reason which led me to give four classrooms for 24 instead of for 25. One of the most important requirements of the competition was to provide as many classrooms as possible on the level of the assembly hall, and it seemed to me that the opportunity of placing all the classrooms on the ground floor more than compensated for the slight reduction of four pupils in 250. No competitor would incur the risk of departing in any degree from the conditions unless he felt justified by a very substantial advantage gained by doing so.

The same correspondent rightly says that the assembly hall is larger than necessary for the number of pupils before the school is extended, but he does not seem to consider the difficulty of satisfactorily and economically extending the hall, and of doing so without stopping the work of the school for a long period. Moreover, this difficulty seems to have been felt by the promoters of the competition, for in the replies to queries it was stated that "the assembly hall must be large enough for the completed school, but preference will be given to a hall large enough for present requirements, and which can be readily enlarged," the latter alternative presenting a problem which most of the competitors, judging by their designs, evidently considered impossible to solve satisfactorily.

Another correspondent, "Regulations," states that one of the classrooms does not give the necessary space for the teacher. He evidently bases this assertion on the sketch plans which have been published, and which do not agree with the original drawings in this respect. "Regulations" also finds fault with the fact that the end walls of the dining-room are supported on girders (surely a somewhat trivial criticism), and says that "this, I believe, is not an unusual method of construction in competition design." I trust that "Regulations" will pardon me for reminding him that this is a very usual method of construction in actual building also. The same critic surmises that the cubical contents of my scheme exceeds that of his own, although he naïvely admits that he has not seen any sections or elevations of my design. This certainly seems a somewhat hazardous method of criticism.

Finally, "M.E." finds fault with the fact that part of the building is placed comparatively near to the south boundary, so that adjoining owners may at some future time erect buildings which would interfere with the light of some of the rooms. I do not think that this objection can be sustained, for the buildings are intentionally grouped so that all the classrooms except one are lighted from the length of the site, and the science rooms, which are placed near the south boundary, have additional clerestory light on the opposite side.

In conclusion, I cannot but remark that many of your correspondents seem to have allowed their minute devotion to the strict letter of the conditions and regulations to have distracted their attention from the larger problems and essential requirements of the competition.

Yours truly,
Edwin F. Reynolds.

Birmingham.

The Bath Stone Quarries.

Sir,—My attention has been called to a paragraph, for which I am personally responsible, in Vol. V. of "Modern Buildings" to the effect that all Bath stone quarries "are owned by the same great combine." This, it appears, is not correct, as there are three large quarries producing stone of the best quality in other ownership, namely: Messrs. Marsh, Son and Gibbs, Ltd., of Hartham Park Quarries; Messrs. Yockney and Co., of the well-known Corsham Down quarries; Messrs. The Corsham Quarrying Co., Ridge Quarry, adjoining Monk's Park Estate; and several smaller firms.

I should be very sorry if any statement of mine, however inadvertently inaccurate, were harmful to the interests of others, as it seems this is likely to be, and should be obliged if you would kindly allow this letter of explanation to appear in correction thereof.—Yours truly,

(Signed) G. A. T. Middleton.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

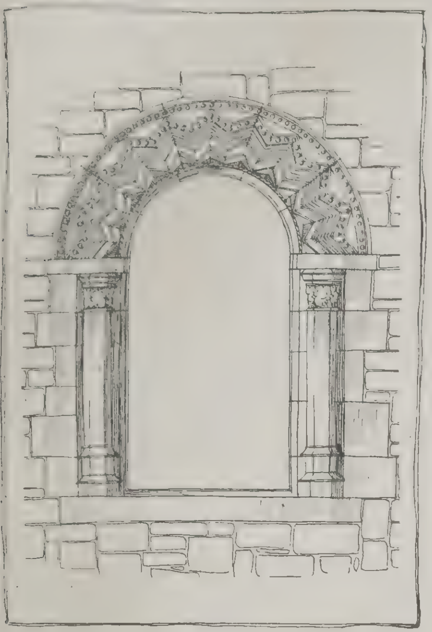
Date of Delivery	Competition.
June 15	ELEMENTARY SCHOOL AT HESWALL (for 300 Children).—Conditions from J. H. Grundy, clerk to Administrative Sub-Committee, District Council Offices, Hoylake.
June 24	REMODELLING OF SMITHFIELD, UTTOXETER (for cattle, sheep, pigs and calves).—Premium £20, for plan, specification and estimate. Particulars from F. S. Hawthorn, clerk, Council Offices, Uttoxeter.
July 1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5. Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth. Summary in last week's issue.
July 1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown. Summary in last week's issue.
July 2	CARNEGIE LIBRARY AT KILKENNY.—To cost £1,800. "Design, specification, and bill of quantities." Particulars from E. O'Connell, Town Clerk, City Hall, Kilkenny.
July 6	ZION INSTITUTIONAL CHURCH, MANCHESTER.—Limited to Manchester architects. Particulars from J. S. Gibson, 5, Old Bond Street, London, W.
July 30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth. Summary in last week's issue.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept. 2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept. 11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN.—Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in "Builders' Journal," May 1st.
No date	HYDROPATHIC ESTABLISHMENT AT MACDUFF, BANFF.—Particulars from Town Clerk, Banff.

Proposed Building and Allied Trades Club.—A meeting of manufacturers and others interested in the building trades took place on Saturday evening last at the Ship Restaurant, Charing Cross. After dinner, Mr. J. M. White, of the Granite Silicon Plaster Co., Ltd., who presided, in a short address gave an outline of the scheme for establishing the above club. A general discussion ensued as to the form the club should take, and it was put to the ballot and carried by the casting vote of the chairman that the club should be run on purely social lines. The following gentlemen were unanimously elected as members of the committee:—Mr. Robt. F. Clark (Gay & Co.), Mr. Percy Tomey, Mr. Robert Husbands (Höfler, Ltd.), Mr. Alfred M. Nelson (Granite Silicon Plaster Co.), Mr. Johnston, and Mr. Jas. M. White. This is the second meeting which has taken place to discuss this subject. There will be another one in June, when it is hoped some definite arrangements will be decided upon.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Seventeenth Series.)

CLASS A (ARCHITECTURE).



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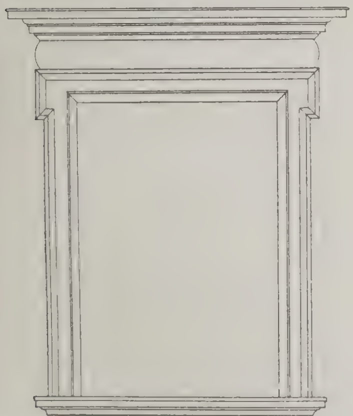

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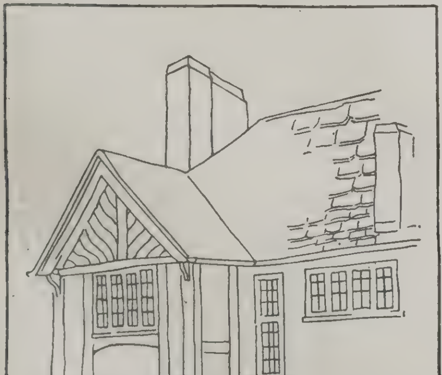

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This competition has been instituted with the object of increasing the circulation of The Builders' Journal by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Price.—£10

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

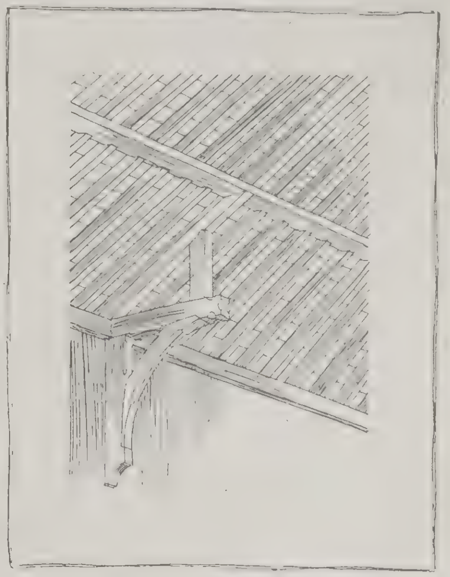
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of The Builders' Journal, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of The Builders' Journal, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any volation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

(For Coupons see page xxxv.)

Copies of "The Builders' Journal" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.

CLASS B (BUILDING).



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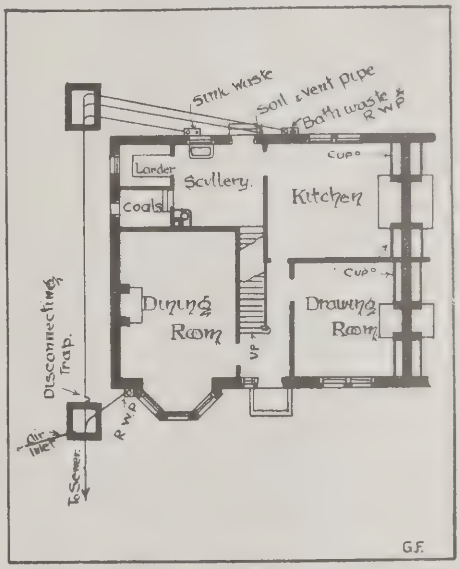

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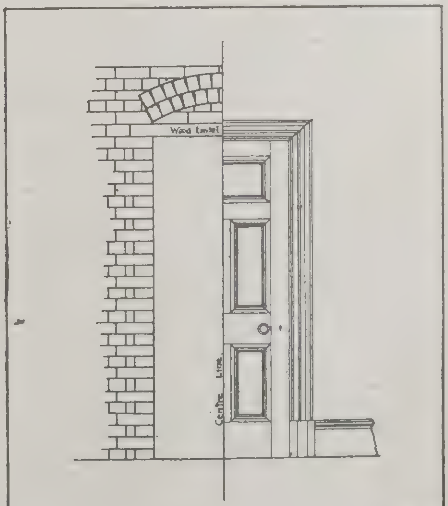

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Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

May 31. Chelmsford.—*Taking down and rebuilding the bridge* over the Cobbin Brook in the parish of Waltham Holy Cross. Persons desirous of tendering can, upon personal application at the office of P. J. Sheldon, M.Inst.C.E., chief surveyor, Office of the Chief Surveyor, Chelmsford, see the drawings and draft contract, and obtain the specification, form of tender, and bills of quantities. Sealed tenders, endorsed "Tender for Cobbin Brook Bridge," must be delivered on or before May 31.

May 31. Pembroke.—*Erection of a battery house* and all matters connected therewith at their existing electric light station, South Lotts Road, in the Urban District, for the Pembroke U.D.C. Specification, conditions of contract, and quantities can be inspected, and tender form obtained of J. C. Manly, clerk to the Council, Town Hall, Ballsbridge, Pembroke, Co. Dublin, any day during office hours. Persons contracting will be required to employ local labour as far as possible. Tenders to be delivered at this office before noon on May 31.

May 31. Dunfermline.—*Erection of proposed new business premises*, Queen Anne Street, for Mr. J. M'Intyre, auctioneer. Plans and specifications may be seen and all further information obtained on application to J. T. Scobie, architect, with whom schedules of measurement may be had. Estimates to be lodged with the Proprietor on or before May 31, marked "Tender New Premises, Queen Anne Street."

May 31. Hartlepool.—*Construction of a lifeboat house* and slipways for the Royal National Lifeboat Institution at Middleton, in the Borough of Hartlepool and County of Durham. Contract drawings, terms, and conditions of contract and specification may be seen on application to A. Belk, hon. secretary, Borough Buildings, Hartlepool, Durham, or at the office of W. T. Douglass, engineer and architect to the Royal National Lifeboat Institution, 15, Victoria Street, Westminster, S.W. Copies of the form of tender, conditions of contract, and bills of quantities may be obtained on application to the Engineer and Architect upon payment of a deposit of £1 1s. Copies of certain of the plans may be obtained from the Engineer and Architect on payment of 2s. 6d., which sum is non-returnable. Sealed tenders, which will only be received on the forms supplied, endorsed "Tender for Hartlepool Lifeboat House and Slipways," to be delivered to the Hon. Secretary at the address given at or before noon on May 31.

May 31. Hayes and Streatham.—*Erection of*:—No. 1, six dwelling-houses at Hayes, Middlesex; No. 2, four sale shops and dwelling-houses at Hayes, Middlesex; No. 3, six villas at Streatham. Builders should send their names, accompanied by remittance of £1 1s. for each contract to be tendered for, to Trevor & Taaffe, surveyors, 22, Norfolk Row, Sheffield, or 70, Finsbury Pavement, E.C., not later than May 31, when plans, specifications, &c., will be forwarded.

May 31. Pembroke.—*Erection of a lock-up* at Hakin, and a petty sessions room at Milford Haven. Contractors may tender for both buildings together or for either of them. Plans and specifications may be seen at the office of A. H. Thomas, assistant county surveyor, St. Thomas Green, Haverfordwest. Tenders, sealed and endorsed "Tender for Works at Milford and Hakin," must reach W. D. George, clerk to the Pembrokeshire C.C., Shire Hall, Haverfordwest, by May 31.

May 31. Sleaford.—*Restoration of Silk Willoughby Church*, near Sleaford. Builders desirous of tendering may inspect the plans and specification on application at the Rectory until May 31, when tenders are to be sent to C. H. Fowler, F.S.A., architect, The College, Durham. Sole tenders are required, except for plumbing, for which separate ones will be accepted. Quantities can be obtained on application to G. R. Boreham, quantity surveyor, 24, John Street, Sunderland.

June 1. Mundesley, Norfolk.—*Construction of a sea-wall* and gangway approach to the beach at Mundesley, Norfolk, for the Erpingham R.D.C. Plans and specification can be inspected and quantities obtained at the offices of A. F. Scott, F.S.I., engineer, 24, Castle Meadow, Norwich, and West Street, Cromer. Also for the erection of groynes on the sea-front and the repair of the outfall pipe at Mundesley. Plans and specification can be inspected at the Engineer's offices, as above. Tenders to be delivered not later than 10 a.m. on June 1, endorsed "Tender for Mundesley Gangway" or "Groyne" respectively, and addressed to the Chairman of the Works Committee, care of A. F. Scott, 24, Castle Meadow, Norwich.

June 1. New Tredegar.—*Erection of a new schoolroom*, &c., for the Trustees of the English Wesleyan Church, New Tredegar. Plans and specification and full particulars may be obtained of D. W. Price, architect, New Tredegar, to whom sealed and endorsed tenders are to be sent not later than June 1.

June 1. Silsden.—*Erection of new premises* on a site at Keighley Road, Silsden, for the Silsden Co-operative Society, Ltd., who are desirous of receiving names of contractors who are prepared to give a tender for the same, either for the whole contract or separate contracts. Quantities will be provided in due course. All contractors desiring to give tenders should send their names by June 1 to "Architect," Co-operative Wholesale Society, Ltd., 1, Balloon Street, Manchester.

June 3. Carlisle.—*Extensions at the Carlisle Steam Laundry*, Warwick Road, Carlisle. Persons desirous of tendering are requested to send in their names to the offices of M. Johnstone, architect and engineer, 22, Lowther Street, Carlisle, on or before June 3. Bills of quantities will be supplied.

June 3. Drighlington and Holmfirth.—*Proposed alterations* to the "Valley Inn," Cockersdale, Drighlington; also to the "George Hotel," Holmfirth, near Huddersfield, for S. Smith, of the Old Brewery, Tadcaster. Contractors desirous of tendering must please forward their names to T. Winn & Sons, architects, 84, Albion Street, Leeds, not later than June 3, when bills of quantities will be duly forwarded.

June 3. London, N.—*Taking down the existing walls* and fences on the north side of Angel Road and re-erecting and extending same; also for the erection of a public sanitary convenience (excluding sanitary fittings and plumbing work) and an electric light sub-station, to be erected adjacent thereto, for the North Metropolitan Electric Power Supply Co., and situate at the western end of Angel Road, adjoining Fore Street, Edmonton, for the Edmonton U.D.C. Forms of tender, specification and quantities, and any further particulars required, may be obtained on application to G. E. Eachus, M.Inst.C.E., the engineer to the Council, Town Hall, Lower Edmonton. Fair wages clause. Plans of the intended works can be inspected at the Engineer's Office, Town Hall, Edmonton, during office hours. Sealed tenders, which must be on the forms supplied by the Council's Engineer, marked on the cover, "Tender for Sanitary Convenience and Sub-Station," to be delivered at the office of W. F. Payne, clerk of the Council, Town Hall, Edmonton, not later than 12 noon on June 3.

June 4. Accrington.—*Erection of brushworks* proposed to be built near "Penny House" for W. Phillips. Contractors desirous of tendering are requested to make application, by letter, before June 4, to H. Ross, architect, Cannon Street, Accrington.

June 4. Banbury.—*Construction of a new engine-shed* and other works at Banbury, for the Directors of the Great Western Railway Co. Plans and specification may be seen and forms of tender and bills of quantities obtained at the office of the New Works Engineer at Paddington Station, between 10 a.m. and 4 p.m. Tenders, addressed to G. K. Mills, secretary, Paddington Station, London, and marked outside "Tender for Engine-Shed, Banbury," will be received on or before June 4.

June 4. Cardiff.—*Erection of a new refreshment room* at Cardiff Station, for the Directors of the Great Western Railway Co. Plans and specification may be seen, and forms of tender and bills of quantities obtained, at the office of the Engineer, at Newport Station, between 10 a.m. and 4 p.m. Tenders, addressed to G. K. Mills, secretary, Paddington Station, London, and marked outside "Tender for Cardiff Refreshment Room," will be received on or before June 4.

June 4. Keighley.—*Erection of a laundry* off West Lane, Keighley, for the Keighley and District Co-operative Laundries Association, Ltd. Plans may be seen and quantities obtained at the offices of J. Haggas & Sons, architects, North Street, Keighley. Sealed tenders, endorsed "Laundry," to be sent to H. Whitaker, Co-operative Society's Office, Brunswick Street, Keighley, on June 4.

June 4. London, N.E.—*Structural and other alterations* to the kitchen, dining-hall, and other parts of the Workhouse, Waterloo Road, Victoria Park, N.E., for the Bethnal Green Board of Guardians. Drawings, specification, and a copy of the conditions and form of contract may be seen on application between 10 a.m. and 4 p.m. at the office of A. W. Finch, architect, 76, Finsbury Pavement, E.C. Bills of quantities and forms of tender, prepared by G. T. G. Wright, 3, Great Winchester Street, E.C., will be forwarded upon application to D. Thomas, clerk to the Guardians, Guardians' Offices, Bishop's Road, Victoria Park, N.E. All applications must be accompanied by a deposit of £5. The contractor will be required to give approved security for the due performance of the contract. Sealed tenders to be received at the offices of the Guardians not later than 10 a.m. on June 4.

June 4. Wilmcote.—*Erection of new station buildings* at Wilmcote, Warwickshire, for the Directors of the Great Western Railway. Plans and specification may be seen and forms of tender and bills of quantities obtained at the office of the New Works Engineer at Paddington Station, between 10 a.m. and 4 p.m. Tenders, addressed to G. K. Mills, secretary, Paddington Station, London, and marked outside "Tender for Wilmcote Station," will be received on or before June 4.

June 7. Glasgow.—*Reconstruction of Glasgow Royal Infirmary*, C Block (Nurses' Home), D Block (Power House), and E Block (Laundry). Tenders are invited for the following works:—1, Digger, mason, brick, and steel; 2, carpenter, joiner, and glazier; 3, slater; 4, plumber; 5, plaster; 6, tile. Drawings may be seen at the office of J. Miller, A.R.S.A., architect, 15, Blythswood Square, Glasgow, from whom also copies of the schedules may be obtained on payment of £1 1s. Sealed tenders, endorsed "Tender for C, D, and E Blocks," to be lodged with H. Lamond, secretary, 93, West Regent Street, Glasgow, on or before June 7.

June 8. Kingsbury Episcopi.—*Alterations and improvements* at the Council School, Kingsbury Episcopi, to be carried out in the summer holidays. Plans and specification can be seen at the office of Cottam and Samson, Bridgwater, from whom any information may be obtained. Sealed tenders must reach the County Education Office, Weston-super-Mare, before 12 noon on June 8.

June 8. Barry.—*Erection of a general accident and surgical hospital* at Wyndham Street, Barry, for the U.D.C. Plans and specifications may be seen and bills of quantities obtained at the office of J. C. Pardoe, surveyor, 160, Holton Road, Barry, on payment of £2 2s. Separate tenders will be required (1) for the plumbing work, (2) for the remainder of the works. Sealed tenders, endorsed "Hospital," to be sent to T. B. Tordoff, clerk, Council Offices, Barry, on or before 10 a.m. on June 8.

June 10. Chesterton.—*Retort bench of seven arches*, together with chimneys and accessories at the Gas Works, Chesterton, Staffs, for the Wolstanton United U.D.C. Copies of the drawings and specifications may be obtained from C. Woodall & Son, engineers, Palace Chambers, Bridge Street, Westminster, S.W., upon payment of a deposit of £3 3s. (by cheque). Tenders will be received by E. Hollinshead, clerk to the Council, Town Hall Chambers, Tunstall, Staffs, not later than 10 a.m. on June 10.

June 10. Worcester.—*Rebuilding in brickwork* Blackminster Bridge, near Evesham, and the Littleton and Badsey railway station, G.W.R., for the Highways and Bridges Committee of the Worcestershire C.C. Copies of the specification and drawings can be obtained of J. H. Garrett, surveyor of county bridges, Shire Hall, Worcester, on payment of £1 1s. Sealed tenders, marked "Tender for Blackminster Bridge," must reach him not later than 10 a.m. on June 10.

June 11. Barnes.—*Erection of an extension* of their Electricity Works, High Street, Mortlake, S.W., for the Barnes U.D.C. The drawings and specification can be seen and bills of quantities and forms of tender obtained on application to the Engineer and Surveyor at the Council House, High Street, Mortlake, S.W., to whom tenders, sealed and endorsed "Tender for Proposed Extension of Electricity Works," must be sent in not later than 12 noon on June 11. The sum of £1 1s. will be required as a deposit. No tender will be considered except upon the prescribed form.

June 11. Feltham.—*Alterations to nine classrooms* at the Feltham Industrial School, Middlesex, consisting of the insertion of new windows and air flues, and the decorative work consequent thereon, for the L.C.C. Full particulars, and also information as to the conditions to be observed by tenderers, will be given in the "London County Council Gazette" of May 20. Tenders must be upon the official forms, to be obtained from the Architect's Department, 15, Pall Mall East, S.W., and no tender will be received after 10 a.m. on June 11.

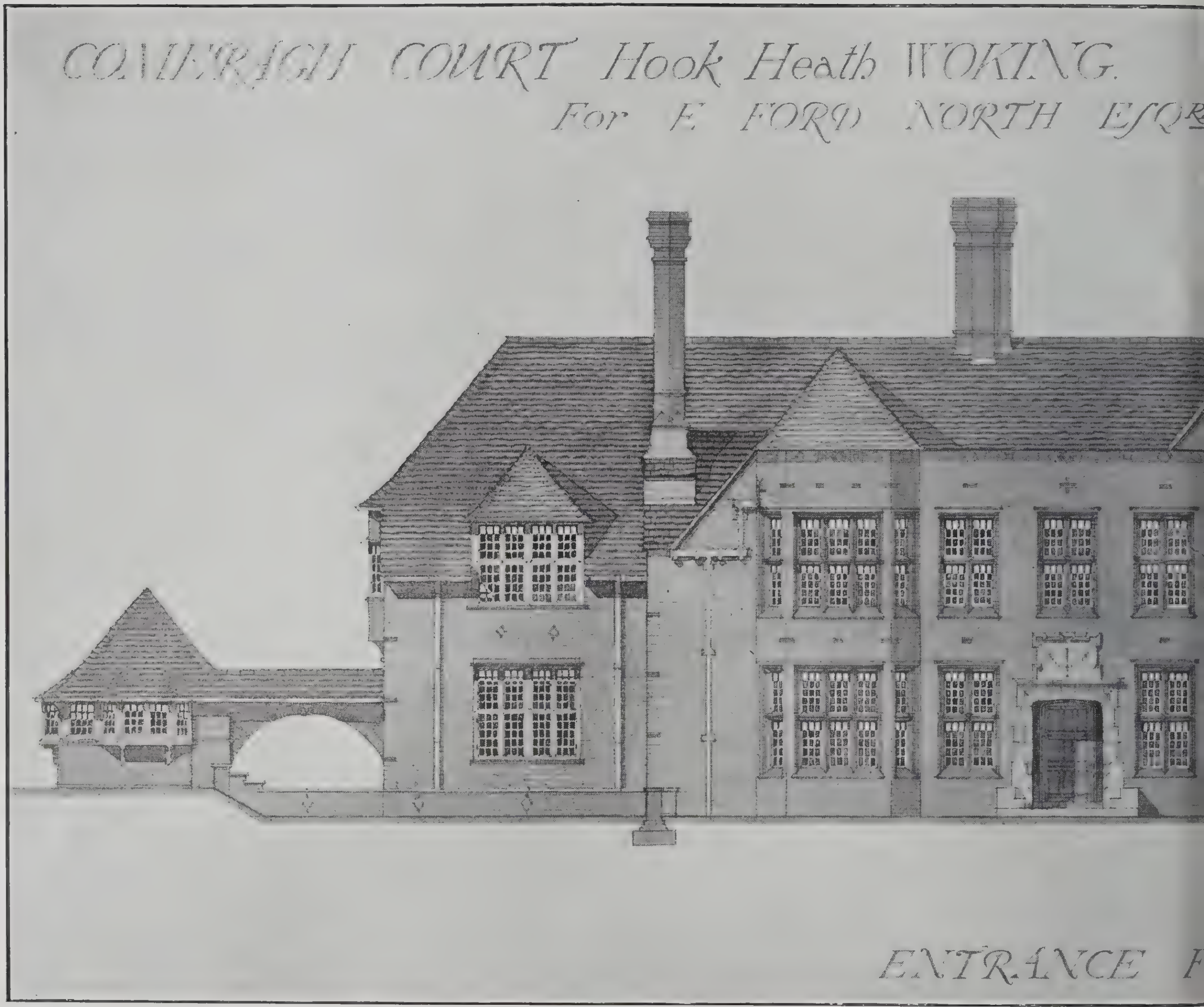
June 11. Chelmsford.—*Erection of a new post-office* at Chelmsford. Drawings, specification, and a copy of the conditions and form of contract may be seen on application to the Postmaster at Chelmsford. Bills of quantities and forms of tender may be obtained at the undermentioned address on payment of £1 1s. Tenders must be delivered before 12 noon on June 11, addressed to the Secretary, H.M. Office of Works, &c., Storey's Gate, London, S.W., and endorsed "Tender for Chelmsford New Post-office."

June 11. London, N.W.—*Supply and erection of an "above-ground" convenience* at Church End, Willesden. Plans and specification may be seen, and form of tender and all further particulars obtained upon application to O. C. Robson, M.Inst.C.E., Public Offices, Dyne Road, Kilburn, N.W. Tenders, endorsed "Convenience, Church End," to be delivered at the Offices of the Council not later than 4 p.m. on June 11. A £10 note to be deposited with each tender.

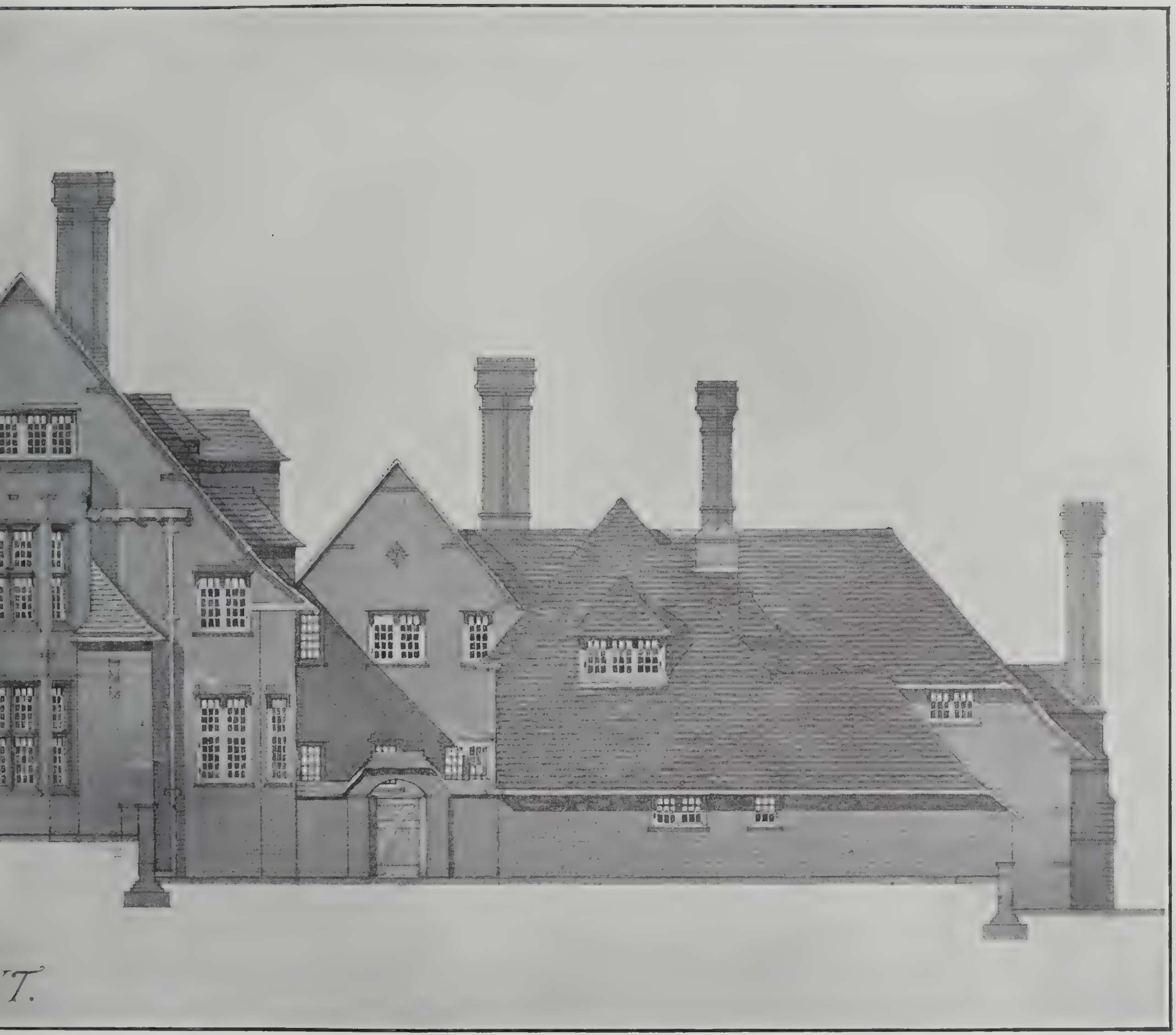
June 17. Whitehaven.—*Erection and completion* of a new mixed secondary school at Whitehaven in accordance with plans and specifications prepared by Grayson & Ould, architects, 31, James Street, Liverpool. Copies of bills of quantities can be obtained upon application at the architects'

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

Supplement to
The Builders' Journal and Architectural Engineer,
Wednesday, June 5th, 1907.



CYRIL B. TUBBS AND A. A. MESSER, ARC



(Royal Academy Exhibition, 1907.)

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June 5, 1907. Volume 25, No. 643

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

Notices.

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The Trade Catalogue. THE usefulness of the trade catalogue is greatly impaired by a want of harmony among manufacturers, and, more often than not, by a want of appreciation of the requirements of the person for whom it is intended. In the preparation of a catalogue expert knowledge is required, which the majority of firms, as one can only expect, do not possess. Such expert knowledge is obtainable, but manufacturers seem to think that they can do far better themselves. Thus, in many cases, the trade catalogue is badly got-up, and contains a good deal that is not of the slightest use. There are many firms who, while they do not believe in the utility of sending out circulars, will send out broadcast expensive catalogues which are so ill arranged that they serve no other purpose than a circular, and a bad one at that. The catalogue is not by nature an advertising medium. If circulars are recognised as of very little value, the catalogue is no better: if it should have been glanced at once and kept, it is placed upon a shelf with others, or, more probably, dumped in a pile where there is still less likelihood of its being consulted. The attention of architects, engineers, contractors, and others is best secured by advertisement in the trade press. Even if an article has been chosen on personal recommendation or by means of canvassers, to keep it fresh in the minds of professional men it must be continually advertised and brought under their constant notice. The essential purpose of a catalogue is something different—namely, that it shall be sent in answer to an enquiry, in order to give fuller information, prices, and data, of service in design, specification, and purchase. It should be retained for similar service on a future occasion. The chief disadvantage possessed by the trade catalogue lies in a principle beyond the control of any one firm—there is no standardisation of its form. Most firms, in preparing their price-lists or catalogues, appear to aim at issuing something entirely different in shape and size from any other catalogue. But mere oddity of form is, of itself, no recommendation. The only thing to ensure catalogues being continually used is convenience of reference, and, to secure this, they must be kept in a bookcase. The miscellaneous shapes and sizes of catalogues prevent this, and, as a result, catalogues are, as a rule, jumbled together in some pile, if they are not thrown into the waste-paper basket. When there is any desire to consult them again, a fresh copy is written for, or the price and size of goods may be guessed, or something substituted upon which information can be obtained more readily. We often hear the cry that specifications keep repeating descriptions of superannuated and out-of-manufacture goods; but manufacturers have themselves largely to blame. It arises from the difficulty of reference for information as to newer and better articles among the usual heterogeneous collection of catalogues supplied. The only new manufactures which do get included in specifications are those which are continually advertised and come constantly before readers of the trade papers. A great deal of money is wasted and much inconvenience caused by the destruction of large and expensively-produced catalogues. Furthermore, when it is desired to amend any large catalogue, and add something new thereto, the only means is to reprint the whole work. But there are several means of binding catalogues whereby fresh sheets can be added or substituted at any time for those out of date. The great saving to manufacturers that would be effected if this could be carried out generally is obvious. Moreover, such bindings would be very advantageous to the client, because he need then only keep those portions he wants. If catalogues were made with covers of standard sizes, and two or three standard sizes of pages, punctured with holes one standard distance apart, they could be kept together in any way desired, and, by their fitting the shelves of a bookcase, it would be possible to have them always convenient for reference. In addition, the name of the firm and a general description of the goods illustrated should be printed on the back boldly; then they could be kept in alphabetical order, or arranged in classes according to the goods. A miscellaneous volume could be used for inclusion of sheets from firms whose specialities are insufficient to warrant the production of a large catalogue. The loose leaves for such catalogues should be printed only on one side, and an illustration with full dimensions should be given as well as the prices. We mention the question of full dimensions, because this is very useful to draughtsmen in preparing drawings, or to an architect or engineer in planning. A similar standardised system might be adopted for smaller books of the pocket-book character; then the architect or engineer might gather together in one cover sheets from many pocket-books, so as to serve as a really useful desk-companion, whereas, at the present time, many pocket-books, neatly got-up and containing some useful information, are not used because they are too many to be conveniently kept. The great saving in time and money, and the inestimable advantage to the building trade, need not be dilated upon. We would urge the importance of some standards being drawn up and an agreement arrived at between the chief manufacturers to bring about such a desirable reform.

New, True, or Neither

I have pounced upon "The Lost Word," a novel, and an architectural novel at that. It is a very entertaining story of a young architect who built an amazing church with the help of a most amazing band of craftsmen, to a chorus of epigrams. A sculptor says: "You builders . . . . . all begin at the end of your art and set about erecting shrines for every sect and municipality that will have you, before it has even been proved that you are fit to build cottages. And meanwhile you drive your fellow men, for want of rightly-built houses, to live in tenements . . . . A house, rightly built, is a temple of Hestia; but I wonder what the tutelary spirit of a fireproof flat would be like?"

* * *

We are really fond of this sculptor, Mark Gwent. The architect, Paul Vickery, wanted craftsmen, and got this advice: "You had better get some artistic idiots from the Guild of Saint Eloy to work under us; the clever artist is nearly always an ass." This is dreadful language to use about a guild. Everyone knows that the only wise and perfect craftsmanship comes from a Guild—[ADVT.]—and the authoress must not trample on our cherished convictions.

* * *

The architect left Keble to enter "the office of the best ecclesiastical architect of the day: a person justly famous for his marvellous imitations of the numerous styles that he had failed to assimilate."

* * *

"Your fascinating church . . . . You know how good the French are supposed to be at that sort of thing; just like the Japanese, only more *chic*; and of course for a religious building the Japanese style would scarcely do. Catherine has just won something—not the Grand Prix, but very nearly as good—for her bathroom design. Such a pretty idea: dog-fish in the stained-glass windows, and gesso mermaids on the wall, their tails pointing to the taps."

* * *

To real architectural criticism one takes off one's hat. THE LOOKER-ON.

EVERY MAN TO HIS TRADE

"It's a wonder them street cleaners doesn't git run over."

"I'd hate to have their job. I'd be scared stiff all the time."—*Life.*

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Removal of Surface Water.

ESSEX writes: "A client of mine is erecting a detached house, and plans have been submitted to the rural district council. The council refuse to approve the plans because part of the rain-water is shown discharging into the soil drains. The following is their by-law with reference to surface water:—'Where the council have provided or have the right to use for the disposal of surface or subsoil water, to the exclusion of sewage, a sewer or drain or other means of drainage and disposal within 100ft. of the site of a new building, the person who shall erect such new building shall construct a covered drain or drains for carrying surface water and, where necessary, subsoil water to the exclusion of sewage from such building, and shall cause such covered drain or drains to communicate with any such sewer or other means of drainage and disposal as is hereinbefore mentioned.' There being no surface-water drain in the road, can they compel me to take the surface water into a storage tank?"

From a consultation of various legal decisions and opinions, such a point does not appear to have previously been raised. An authority has no power to compel the construction of a separate drain for surface water in the ordinary course; but it may obtain such power by by-laws under section 157 of the Public Health Act, 1875. This seems to carry with it a corollary that the authority must provide the surface-water sewer to receive the contents of such drain. You state that there is no such sewer in the road; the existence of a ditch or watercourse, if recognised by the authority, may, however, constitute a surface-water drain. Of this we cannot judge, as we have no details concerning the locality, which we presume is a purely rural one. Under the Private Street Works Act, 1892, an authority may construct separate sewers and charge up apportionments of the cost on the adjoining frontages; but this does not seem to bear on the particular problem. We do not think the authority can compel you to construct the separate drain even in face of their by-law, which is subversive of their contention, because it implies the existence of a surface-water sewer within 100ft. of your property, while you state that no sewer of this description exists. They certainly cannot compel you to construct a rainwater storage tank.

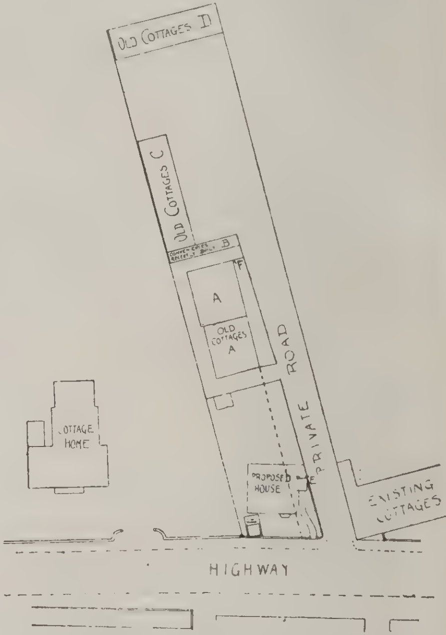
Cost of Government Buildings.

LONDON.—W. writes: "Can you state the cost per ft. cube of the two new Government buildings in Whitehall, or the cube ft. of other buildings of that class?"

No information of the kind has been published respecting the buildings mentioned. The Foreign Office in Whitehall cost 1s. 1d. per ft. cube, but if erected at the present time it would probably cost about 1s. 6d. per ft. cube.

Building Line.

LEEDS.—LOIDIS writes: "I send a block plan of a proposed house, the plans of which have recently been rejected by the local district council on the ground that no portion of the building facing the private road should project beyond the dotted line shown on plan, this line being a continuation of the front of the old cottages marked A. My contention is that it is impossible to fix any definite building line in a private road, especially seeing that the lines of the existing buildings A, B, C and D are so irregular. Which do you consider should be the building lines, both to the private road and to the highway in front of the site? The main angle of the proposed house at E is the same distance from the private road as the houses A at point F."



The district council are certainly within their rights in refusing to pass the plans of this house, coming, as it does, close up to the pavement. The fact that the ownership of the road is in private hands has no bearing whatever upon the case. In my opinion the correct building line in the private street lies *parallel to the private road* at the same distance back as the nearest extremity of property A (section 3 Public Health Act, 1888). The building line in the main street is not yet clearly defined, but I suggest that the same distance back as in the side street would probably be a fair line.

F. S. I.

Building Materials at Kidderminster.

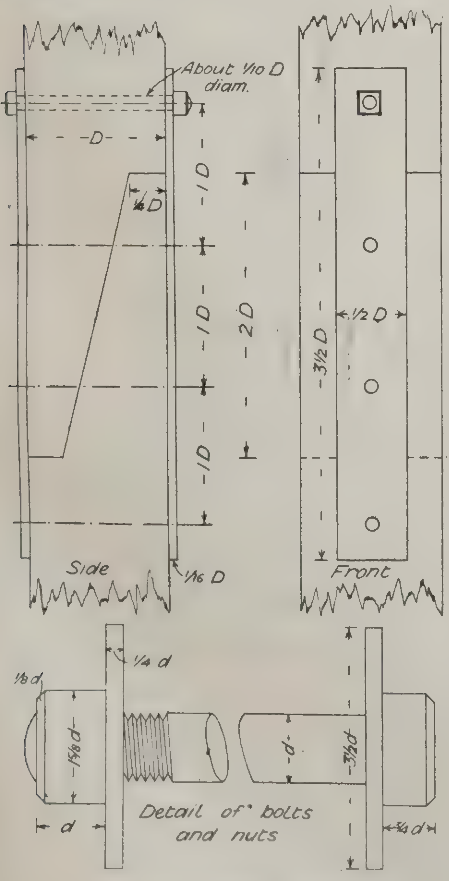
M. writes:—"What are the local building materials at Kidderminster? Is building there cheaper than in London, and what is a fair price per foot cube for ordinary domestic work there?"

The building materials available at Kidderminster, either made there or obtainable within a distance of twelve miles, are bricks, tiles, terra-cotta, lime and sand, and sandstone from Alveley and Highley, adjacent places on the river Severn, eight or twelve miles away. Bangor slates and Bath stone are very frequently used. The price per foot cube for ordinary domestic work cannot be given, as it depends so much upon the quality of the work, but there is no doubt that building is cheaper at Kidderminster than it is in London.

Scarfing Timber Posts.

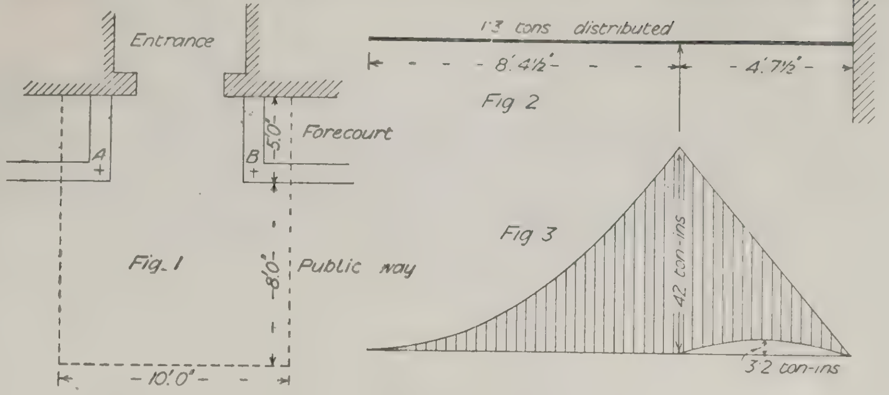
West Hartlepool.—T. W. & Co. write: "We should be glad to know the correct length, shape and thickness of iron plate and bolt for *scarfing* long pitch-pine posts which we are constantly using in the erection of wooden towers. These posts are 7ins., 8ins., 9ins., and 10ins. square sawn pitch-pine and run from 60ft. to 70ft. long. For convenience in framing we are at present making all these scarfs the same in construction and using the same length of scarfing plates. We assume we are providing for transverse strain only. We cannot find that Prof. Adams gives the best length for a scarf in his book or in his paper on 'Joints in Woodwork.' Should there be *two* bolts through plate outside scarf or *one only?*"

There appears to be less known about the proper proportion and arrangement of scarf joints in posts than any other detail of construction. One is constantly finding the very worst possible forms in use, showing no consideration of the principles. The writer has had much experience in timberwork up to 20,000 cub. ft. in one structure, and has adopted the scarf for posts shown by the accompanying illustrations, where the dimensions are given in terms of the diameter. He also made it a rule to break joint with the scarf in adjacent posts, giving not less than 6ft. difference of level. A single line of bolts takes material away from the neutral axis only. The square bearing at ends of scarf takes the load without tending to split the post or force off the fish-plates, and the rake of the scarf leaves a thick root to resist bending. The scarf should stand so that the greatest bending stress comes in the plane of the bolts—*i.e.,* the bending should tend to stretch one plate and shorten the other. The length of scarf adopted is the minimum, but there is nothing gained by increasing it. The bolts should be a good fit in the holes of both iron and wood and the nuts should be tightened up as the wood shrinks. The bolts and nuts should be proportioned as shown in detail, where *d* is diameter of bolt.



SCARFING TIMBER POSTS.

HENRY ADAMS.



STRESSES IN IRON AND GLASS SHELTER.

Stresses in Iron and Glass Shelter.

Rex writes:—"An iron and glass shelter is required over the entrance to a public hall; width is to be 10ft., and total projection 13ft.; 5ft. is over forecourt and 8ft. over public way. The structure to be carried by cantilevers over footway at a height of 10ft., but columns can be placed at A and B. Area of metal in cantilevers to stand a maximum bending moment of 42 tons. (1) Kindly state amount of strain on columns, and also the nature of stresses between A or B and the wall. (2) What system of glazing would be best?"

You have wrongly stated the question (set at the R.I.B.A. Final Examination in June, 1906). There can be no such thing as a bending moment of 42 tons. On reference to the R.I.B.A. "Kalendar" it appears that it should be 42 inch-tons, or more correctly, ton-ins. A moment is always a force by a leverage and must therefore consist of a quantity containing the compound unit. In dynamics the moment is stated as ft.-lbs., inch-tons, &c., but in statics the distinction is made of reversing the order and describing the moments in lb.-ft., ton-ins., &c. The diagram given with the question is shown in Fig. 1. Fig. 2 shows the cantilever and support, carrying a distributed load of unknown amount. The maximum effect of the load is known to be 42 ton-ins., but $\mathrm{M}=\frac{\mathrm{WL}}{2}$, whence $\mathrm{W}=\frac{2\mathrm{M}}{\mathrm{L}}=\frac{2\times42}{8\cdot375\times12}=\cdot8358$ tons on the part projecting beyond the column. Assuming the load over the other part to be similar, it will be $=\cdot8358\times\frac{4\cdot625}{8\cdot375}=\cdot4616$ tons, making a total of $\cdot8358+\cdot4616=1\cdot2974$, say, 1·3 tons on each cantilever. The centre of gravity of this load may be taken as half-way along; then the load on the column will be $\frac{1\cdot3\times6\cdot5}{\times\cdot625}$ $=1\cdot83$, say two tons. To check the working, $\cdot8358\times\frac{8\cdot375\times12}{2}=42$ ton-ins., as shown on the bending moment, diagram Fig. 3, and for the other part $\frac{\mathrm{WL}}{8}=\frac{\cdot4616\times4\cdot625\times12}{8}=3\cdot2$ ton-ins., making the whole of the bending moments as shown by the shaded portion. The stresses between the column and the wall will thus be seen to be tension in the top flange and compression in the bottom flange, the distance not being sufficient to overcome the effect of the cantilever by reversing any of the stresses. The glazing should be without putty owing to the great expansion and contraction of the iron, and any of the numerous patented forms would be suitable.

HENRY ADAMS.

Labour Constants.

Leamington. — Estimator writes: "Where can I obtain a list of constants of labour for use in estimating?"

We advise you to get Coleman's "Approximate Estimates" and Laxton's or Lockwood's "Price-Book."

Glazing Bar to Withstand Acid Fumes.

Bredbury.—C. writes: "Do you know of any metal glazing bar, or any system of patent glazing with condensation channels other than wood, which will withstand the action of the fumes of acetic acid? I have made enquiries from many of the patent glazing firms, but none of them can meet the case."

We do not know of any bar that fulfils the requirements.

Sanitary Engineering.

Carlisle.—G. B. S. writes: "Please recommend a good work on sewers and sewerage schemes."

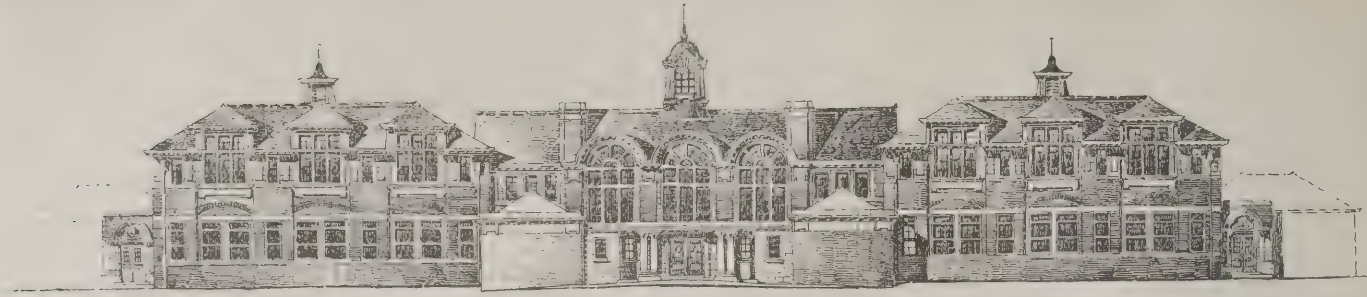
"Practical Sanitary Engineering," by Francis Wood, price 7s. 6d., is the best of its kind, and doubtless will give the information which you desire. There is no single book that adequately covers the whole subject.

Abating a Nuisance Caused by Obstructed Drain.

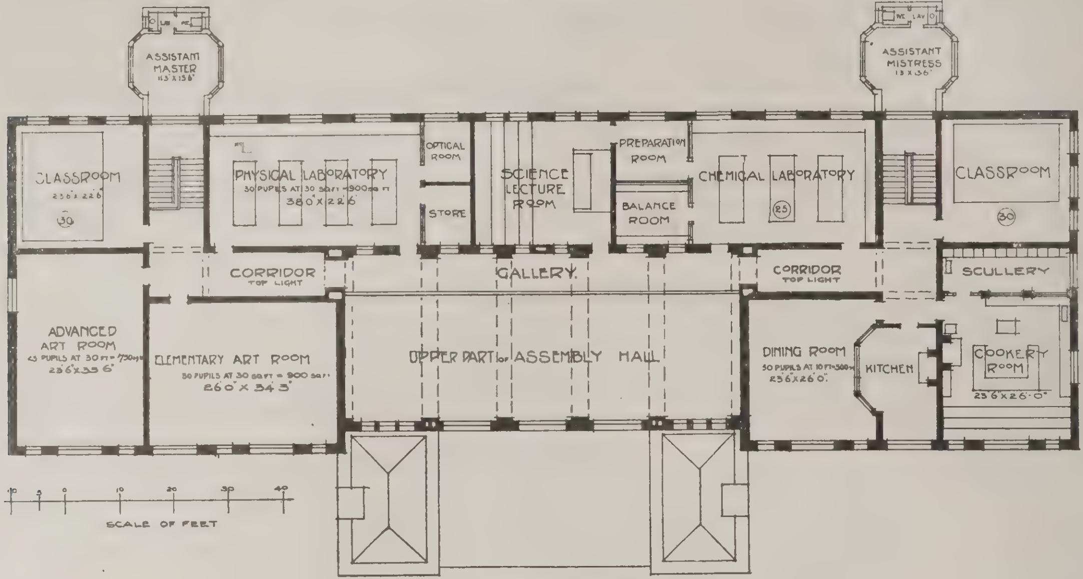
K. writes: "An urban council's surveyor has been served with a notice by three owners of adjoining properties to abate a nuisance on their several properties, caused by an obstructed drain. Are the council compelled to abate the said nuisance, or have they the power to enforce the owners to remedy the supposed obstruction at their own cost? The Public Health Act, 1875, is the only one in force."

It is clearly the duty of the local sanitary authority to keep their sewers clear, and I am of opinion that the action of the three owners is justified under section 19 of the Act you refer to.

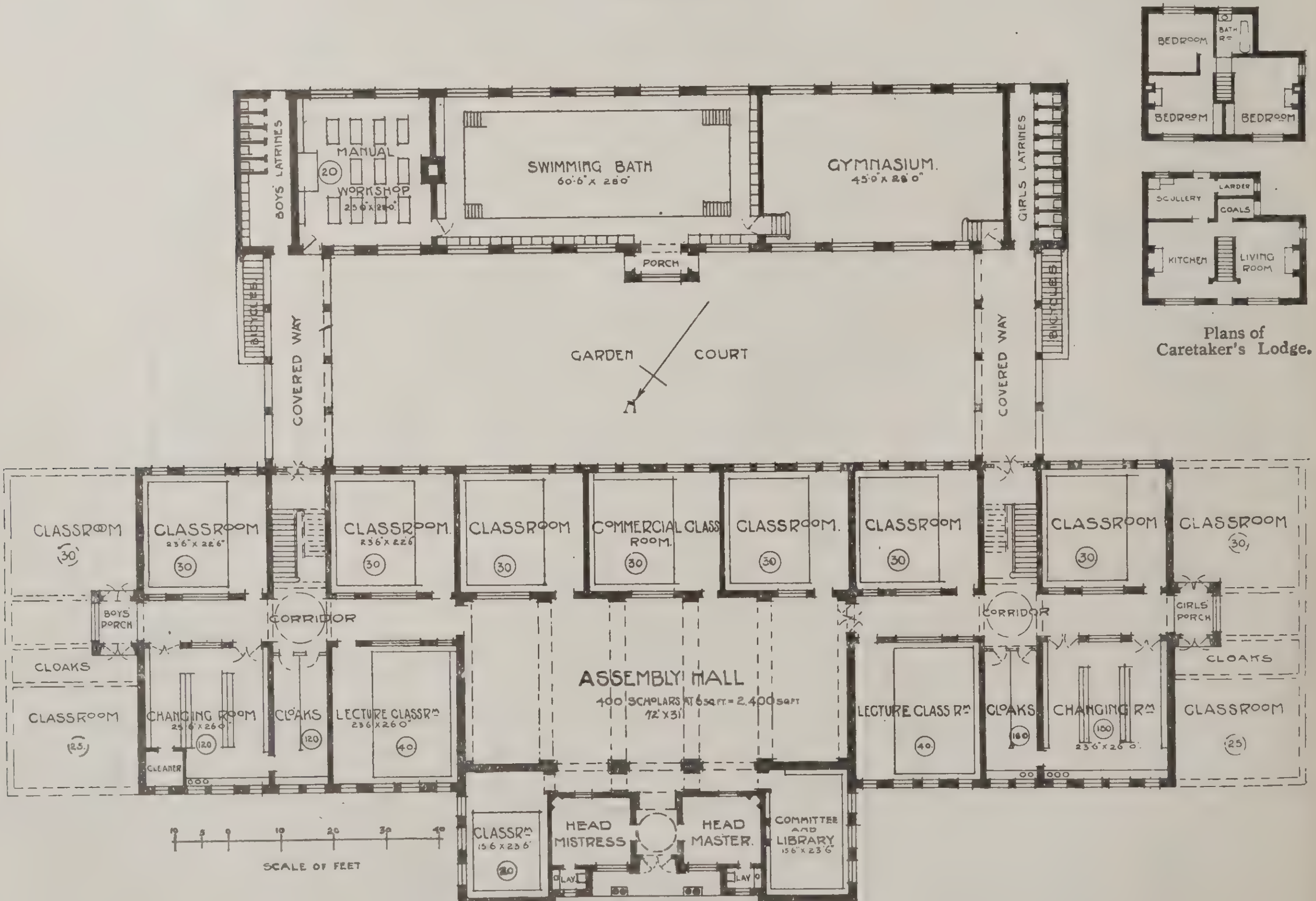
F. S. I.



Front Elevation.



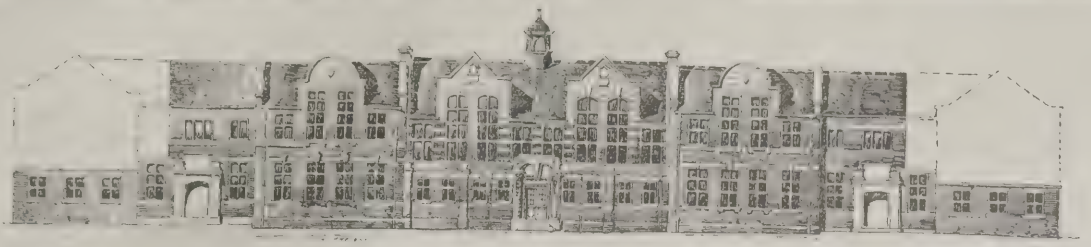
First-Floor Plan.



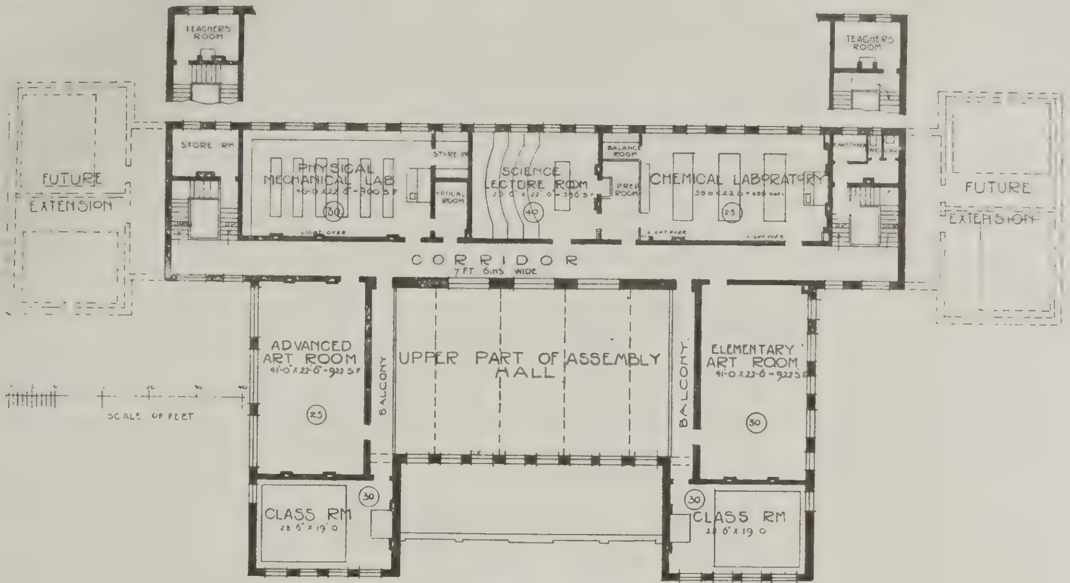
Plans of
Caretaker's Lodge.

Ground-Floor Plan.

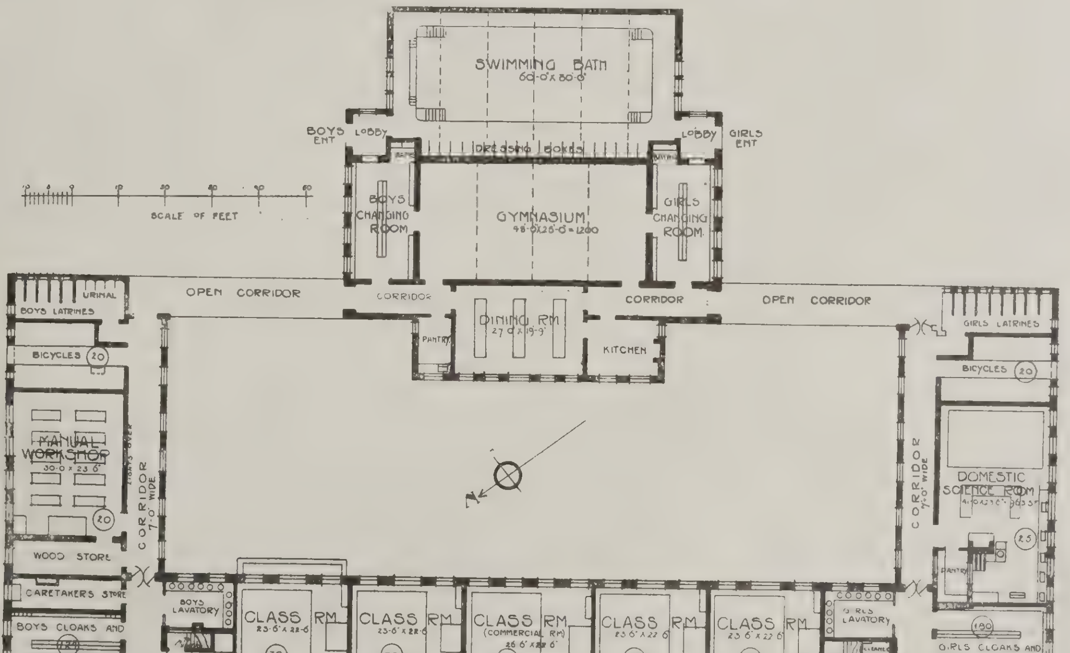
SECONDARY SCHOOL, CASTLEFORD, YORKS: DESIGN PLACED FIRST.
PERCY ROBINSON, F.R.I.B.A., AND W. ALBAN JONES, JOINT ARCHITECTS.



Front Elevation.



First-Floor Plan.



Ground-Floor Plan.

SECONDARY SCHOOL, CASTLEFORD, YORKS: DESIGN PLACED SECOND (AND SELECTED).
W. S. BRAITHWAITE, ARCHITECT.

CASTLEFORD SECONDARY SCHOOL COMPETITION.

The result of this competition has created much surprise in professional circles owing to the fact that the assessor's award has been discarded and the design placed second accepted. Since the publication of the award in our issue for last week we have carefully examined all the designs (thirty-eight in number) which were submitted by architects practising in the West Riding of Yorkshire, and we are certainly of opinion that there has been a miscarriage of justice to the authors of the design placed first, who, without question, have submitted the best scheme. It is only fair to the Governors of the Castleford Secondary School, however, to state that they intended to carry out to the letter the award of their assessor, Mr. Walter H. Brierley, F.S.A., F.R.I.B.A., of York. But they have had to submit the designs to the West Riding Education Authority, and the responsibility for the setting aside of the award rests chiefly with the recently appointed consulting architect to the authority at Wakefield. It also appears that the assessor has had to revise his award to suit this particular official, and that the design now placed second was originally not in the running, and that some other competitor—his identity not yet disclosed—has been passed over, though really entitled to the second premium. The reason for the two months' delay in publishing the award can readily be gathered from the foregoing facts, which, in the absence of some valid explanation, are very discreditable to the West Riding authorities. So far they have not given any explanation whatever, but have treated the competitors in a high-handed manner. A strong action ought to be taken by the architects as a body, to assert their rights in this particular competition. It is stated, on the best authority, that the official responsible for the trouble will adjudicate in the Guiseley secondary school competition in the same district, for which many leading architects from London and the provinces have been specially selected to submit designs.

Site and Conditions.

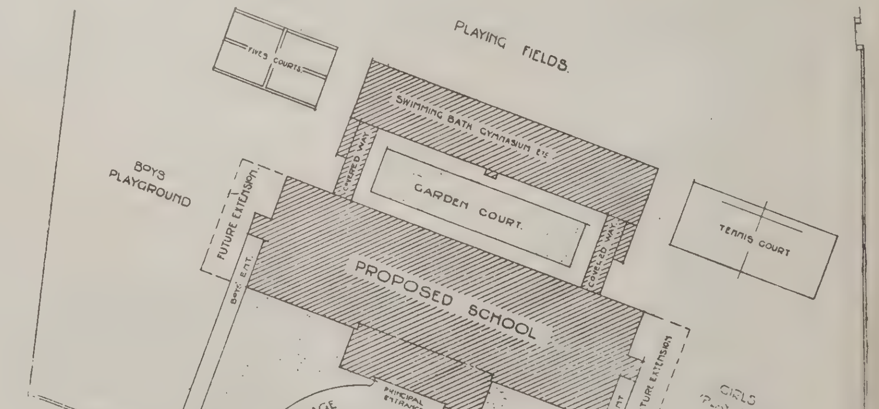
The ground set aside for the proposed school was practically a parallelogram in shape, fairly regular in outline, and practically level, with the main front to Healdfield Road, which is almost north-west in aspect. In the schedule of accommodation the most striking feature was that relating to the special rooms required, considering the total number of scholars—about 300—which had to be provided for. The proportion of students was unequal, the girls numbering 180 and the boys 120. The following rooms were suggested: 10 classrooms (one of which had to be suitable for a mining class, and a larger room for commercial subjects), one lecture room for boys and one for girls (both to be suitable for class teaching), also a physical and mechanical laboratory, with optical room, &c., chemical laboratory, and one science lecture room for experimental demonstrations, with preparation room adjoining. The art rooms included one elementary and one advanced room. A domestic science room for cookery and laundry, with a manual and training workshop, gymnasium and swimming bath, completed the list of special rooms: this, with the usual cloakroom and sanitary conveniences, official suite and teachers' rooms, with a detached caretakers' house, will give an idea of the extensive accommodation which the Governors of the school required for £12,000, including everything necessary for the completion and equipment of the building, with all professional charges. Considering the large number of special rooms asked for, the extensive frontage to the building, and the necessity of providing a structure which had to be thoroughly efficient and of sound workmanship, the sum stated is hardly sufficient when compared with similar schools now being erected in various parts of the country.

Design placed First.

The design of Messrs. Percy Robinson and W. Alban Jones, of Leeds, was awarded the first place by the assessor, with premium of £50. The block plan shows the arrangement on the site. The buildings and playgrounds are well laid out, being disposed at right angles to the main road. In the internal arrangements of the main school the authors have based their plan on the lines of an elementary school, with such variations as were necessary and suitable for secondary education. As a whole, the plan is most compact, well arranged, balanced and economical, and suits the site and the requirements of the accommodation as a whole better than any other scheme exhibited. Every consideration has been given to economical aspect compatible with efficient service in the arrangement of the rooms, so as to secure the least possible corridor and ready means of access to all departments. The future extension is also possible without seriously disturbing the present scheme or interfering with the educational work of the school. There are a few details which could be easily amended without changing the disposition of the rooms. The corridor behind the head-mistress and head-master might be added to these rooms with advantage, and the class-rooms and committee and library could be entered direct from the assembly hall. The conveniences for the head officials slightly interfere with the lighting of their rooms. Cloak accommodation for the girls will be rather cramped as compared with the boys, and the position of the cleaners' room off a changing room is hardly ideal. More space might have been allowed in the garden court, between the main building and the swimming bath block, though the latter block is well cut off and disconnected. Changing space in connection with the swimming bath would be an advantage; although dressing boxes or seats are shown on plan measuring 2ft. by 1ft. 6ins., these can hardly be called serviceable, as their position is rather public and draughty, being near exits and entrance doorways. The swimming bath can only be approached from the open garden court or through the manual workshop or gymnasium. A disconnecting ante ought to have separated the pond from these rooms. The first floor of the main building is equally compact with the ground floor. In every case the classrooms have left-hand lighting, two facing north-west and one north-east. The laboratory suite is well arranged, but the position of assistant teachers' rooms looks as if they had been added as an afterthought; they might have been placed in the main building. The dining-room is badly shaped, and is rather deep to be lighted from one end, the back wall being 26ft. from the windows. The shape of the kitchen also wants revising, and a small scullery with pantry would be a useful addition, also a grocery and coal lift. The elevations are quietly designed and suitable for a school building. The cube contents in the report are given as 474,220ft. at 6d. per cube foot, equal to £11,855.

Design placed Second.

This has been submitted by Mr. W. S. Braithwaite, and gains a premium of £25. The scheme has been suggested by the



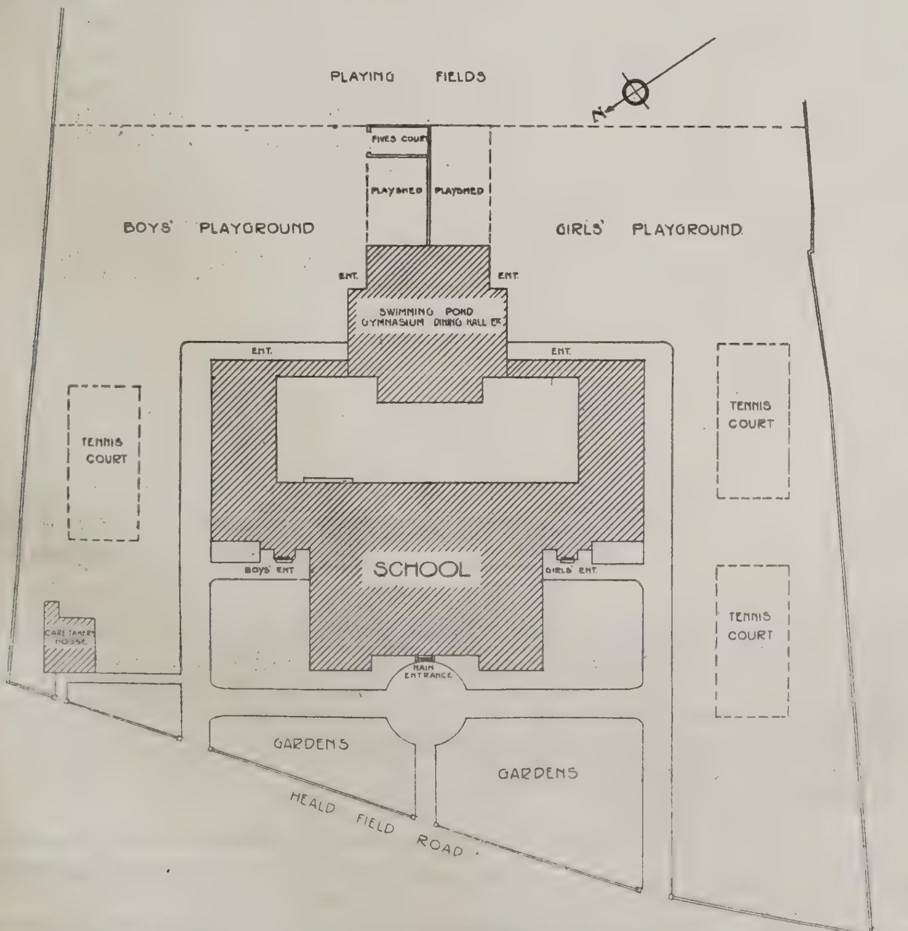
SECONDARY SCHOOL, CASTLEFORD, YORKS: BLOCK PLAN OF DESIGN PLACED FIRST. PERCY ROBINSON AND W. ALBAN JONES, ARCHITECTS.

West Riding authorities to the local Board of Governors for erection in preference to the design placed first, but this has not been formally accepted by the County Council yet. The building does not face the main road squarely, but follows the side boundary lines. Much valuable land is occupied by side walks, formal garden and main school building, which spreads itself over the site in an irregular manner. As a whole the plan is long and straggling, with many wasteful nooks and awkward corners internally, and a great length of corridor compared with other schemes. The total length of internal corridor in the main building is 286ft., compared with 120ft. in the design placed first. Everything appears to have been planned on a lavish scale. Entrance vestibules are undoubtedly too large, also the stairs, which are situated in internal walls and take up more space than is necessary. The heating chamber is entered from an internal stair, and ought to be nearer the swimming bath. Two classrooms have right-hand light, and four have a north-west aspect and two north-east. Future extension of cloak-room, as shown on the ground plan, does not work in satisfactorily and could be improved upon. The block comprising swimming bath, &c., is more compactly planned, and the dining-room is well arranged and convenient for both boys and girls, though the gymnasium is entirely surrounded by rooms and lit from windows above the latter, which does not permit of free-air access. Accommodation for changing is also very extensive, as only one class at a time is likely to use these rooms. The arrangement of the dressing boxes and the swimming bath is to be commended, also the dining-room suite, which is well planned. Apart, however, from the length of corridor and the wasteful planning of the building, this scheme also loses to a great extent through the internal court, which is surrounded by the main building and the swimming block and connecting corridor in such a manner that there is little or no fresh-air access or proper blow-through to prevent air stagnation or stuffiness in the classrooms overlooking the court during the warmer months of the year. Many of the classrooms would also be overshadowed owing to the right-hand projecting wing, which would overshadow the internal court. On the first floor the corridor is again rather lengthy in proportion to the rooms served. A serious mistake has been made in placing the elementary art-room due south. The advanced room is placed some 70ft. distant from the former, and is too large in area for 25 scholars. In the case of the laboratories this objectionable waste in area again occurs. Two classrooms are inconveniently isolated, and liable to interfere with the scholars studying in the art-rooms. The fireplaces in the teachers' rooms are badly placed. From the report of the architect this scheme will cost considerably more than the sum mentioned in the conditions. The cube was given as follows:—438,991 cube feet at 5d. = £9,148 for the main building, with an addition of 91,533 cube feet for the bath block, amounting to £1,906, and caretaker's house £380, also fittings, &c., £1,000, and professional fees, £600; total, £13,034.

With regard to the cubing of the designs placed first and second, we believe the assessor did this with the following result:

Design No. 20 (placed 2nd) ... 627,905 c.f.
Design No. 36 (placed 1st) ... 458,135 c.f.

Difference .... 169,770 c.f.



SECONDARY SCHOOL, CASTLEFORD: BLOCK PLAN OF DESIGN PLACED SECOND (AND SELECTED).
W. S. BRAITHWAITE, ARCHITECT.

Notes on Competitions

Hadfield School.

The first place in this competition has been awarded to Messrs. Ogden and Hoy, of Manchester, and the second place to Mr. G. H. Willoughby, of Manchester.

Scottish National Exhibition, Edinburgh, 1908.

The designs submitted in competition for the main buildings of the Scottish National Exhibition and for the lay-out of the grounds at Saughton Park, Edinburgh, are on view this week in the Synod Hall, Edinburgh. Twenty-six sets have been sent in. The assessor is Mr. John J. Burnet.

Technical Institute, Dundee.

The design of Mr. James H. Langlands, of Dundee, for the new buildings of the technical institute in Bell Street has been adopted by the committee. The competition was limited to local architects.

New School, Merrywood, Bedminster.

Twenty-two designs were submitted in competition for this school, and upon the advice of a professional assessor the Bristol Education Committee at their last meeting selected that of Mr. H. Dare Bryan, F.R.I.B.A., of Bristol. The school is to accommodate 500 junior mixed scholars, and the estimated cost is £6,370.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY		COMPETITION.
June	15	PORCH FOR BORSTAL PARISH CHURCH, ROCHESTER.—Particulars from Hon. Secretary to Committee, Borstal Vicarage, Rochester.
June	15	ELEMENTARY SCHOOL AT HESWALL (for 300 Children).—Conditions from J. H. Grundy, clerk to Administrative Sub-Committee, District Council Offices, Hoylake.
June	24	REMODELLING OF SMITHFIELD, UTTOXETER (for cattle, sheep, pigs and calves).—Premium £20, for plan, specification and estimate. Particulars from F. S. Hawthorn, clerk, Council Offices, Uttoxeter.
July	1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5. Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth. Summary in "Builders' Journal," May 22nd.
July	1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown. Summary in "Builders' Journal," May 22nd.
July	2	CARNEGIE LIBRARY AT KILKENNY.—To cost £1,800. "Design, specification, and bill of quantities." Particulars from E. O'Connell, Town Clerk, City Hall, Kilkenny.
July	6	ZION INSTITUTIONAL CHURCH MANCHESTER.—Limited to Manchester architects. Particulars from J. S. Gibson, 5, Old Bond Street, London, W.
July	30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth. Summary in "Builders' Journal," May 22nd.
Aug.	27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept.	2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept.	11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN.—Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in "Builders' Journal," May 1st.

Notes and News

Change of Address.—Mr. W. Bevan, F.R.I.B.A. (late chief Government architect, Transvaal), has removed from 90, Parliament Chambers, Great Smith Street, to 2, Old Queen Street, Westminster.

The St. Pancras Ironwork Co., Ltd., of 171, St. Pancras Road, London, N.W., have obtained a gold medal for their patent steam wagon exhibited at the New Zealand International Exhibition, Christchurch. They are at present very busy in this department, having large orders in hand.

New Buildings at Derby.—Among buildings in progress at Derby are extensions to the electricity generating station (the drawings for which have been prepared under the direction of the borough surveyor, Mr. John Ward, and the borough electrical engineer, Mr. T. D. Wilmhurst), a new motor garage and repair works in Becket Street for Messrs. A. R. Atkey and Co. (architects, Messrs. Naylor and Sale, Derby: contractors, Messrs. E. Wood and Sons, Derby), a new wing to the Women's Hospital in Agard Street (architects, Messrs. Hunter and Woodhouse, Derby; contractors, Messrs. Walkerdine), new incandescent gas-mantle works off Osmanton Road, for Messrs. Henry Hill & Co. (architects, Messrs. Brewill & Baily, Nottingham; contractors, Messrs. Walker and Slater), and additional county offices at the rear of the building in St. Mary's Gate.

The new Admiralty Building.—The contract for the new Admiralty building at the end of the processional road leading from the Queen Victoria Memorial in front of Buckingham Palace to Charing Cross has been let to Messrs. Mowlem and Son—foundations £30,000 and superstructure (in Portland Stone) between £95,000 and £100,000. The buildings comprise two blocks on either side of a great triple archway, the northern block providing the First Lord of the Admiralty and the First Sea Lord with new and palatial private residences, and the southern block furnishing much-needed extensions for the work of the Admiralty. The buildings are expected to be completed in two years' time. Sir Aston Webb is the architect. The foundations have already been completed, and work on the superstructure will be commenced shortly.

The Cost of the Hammersmith Workhouse.—Writing to the "Times" in reference to the statement made by Mr. Burns in the House of Commons on May 13th, that the cost of the Hammersmith Workhouse and Infirmary was £335 per bed, Messrs. Giles, Gough, and Trollope, the architects, remark:—"Such a statement without qualification is misleading, unfair to the guardians, and calls for a public explanation. This cost of £335 per bed is calculated on the present accommodation for 758 inmates, but with administrative buildings, kitchen, laundries, etc., for 1,456 inmates. The necessary blocks for the additional 698 inmates will cost £80 per bed, and when these are erected the cost of the Hammersmith Workhouse and Infirmary will be £183 per bed." At the Local Government Board enquiry last week Mr. H. E. Gough (of Messrs. Giles, Gough and Trollope) gave evidence, in the course of which he stated that Leavesden Asylum cost £75 per bed; Fulham Infirmary, £115 per bed; Bethnal Green Infirmary, £216 per bed; Hendon Sick Asylum, £297 per bed; and Leicester Infirmary, £154 per bed.

THE SERIOUS CONDITION OF WINCHESTER CATHEDRAL.

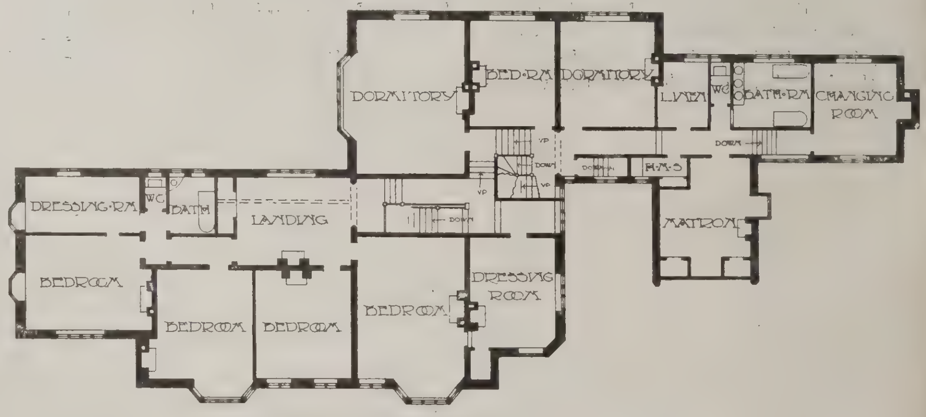
It would seem that the more the condition of the Winchester Cathedral fabric is investigated the more serious are the evidences of decay. Alarming cracks and fissures have been found in the walls of the south transept. It was only a short time ago that similar trouble was found to exist in the north transept, and this has had to be shored up. The south transept doubtless will have to be strutted also, as it is about 4ft. out of plumb. The vaulting of the south aisle of the presbytery is now being removed, it having been found to be so badly crushed and strained as to necessitate this. The diver is working under the Lady Chapel at the eastern end. Shoring is being erected to support the three buttresses of Bishop Fox's aisle on the south side, and it has been discovered that the flying arches at the back of the buttresses are in a very dangerous condition. Excavations are being made to the foundations in readiness for underpinning operations to be carried out here. The large cracks in the north transept have been strengthened, and scaffolding is being erected to deal with the remaining cracks. The work on the west front is proceeding apace, the whole of the north spire having been strengthened and bonded, and the little pinnacles placed in position. The condition of the tower is under investigation.

Two years ago, when the alarming condition of Winchester Cathedral was made public, it was suggested that £100,000 could be spent upon the building, and that that was the sum which would be required to make it thoroughly stable. Detailed examination of the fabric has now proved that its condition is far worse than was ever dreamed of, and the more it is pulled about the greater is the extent of decay revealed. The appeal for funds, which began at a modest £12,000, quickly increased to £30,000, and further revelations made it evident that at least £50,000 was required. Now a further special appeal for the preservation of the north and south transepts is to be made, and it looks as if the suggestion that £100,000 would be wanted was not so far over the mark. At present about £25,000 has been obtained, and for some time now the fund has been almost at a standstill. The Winchester pageant next year will no doubt do a great deal for the fund, but it cannot be expected to yield all that is required.

Our Plate

Comeragh Court, Hook Heath, Woking.

At the time of going to press we have no particulars of this house. The accompanying plans, however, show the accommodation, while the drawing of the elevation indicates that the work is of brick, with tile roof. Messrs. Cyril B. Tubbs and A. A. Messer, of Woking, are the architects.



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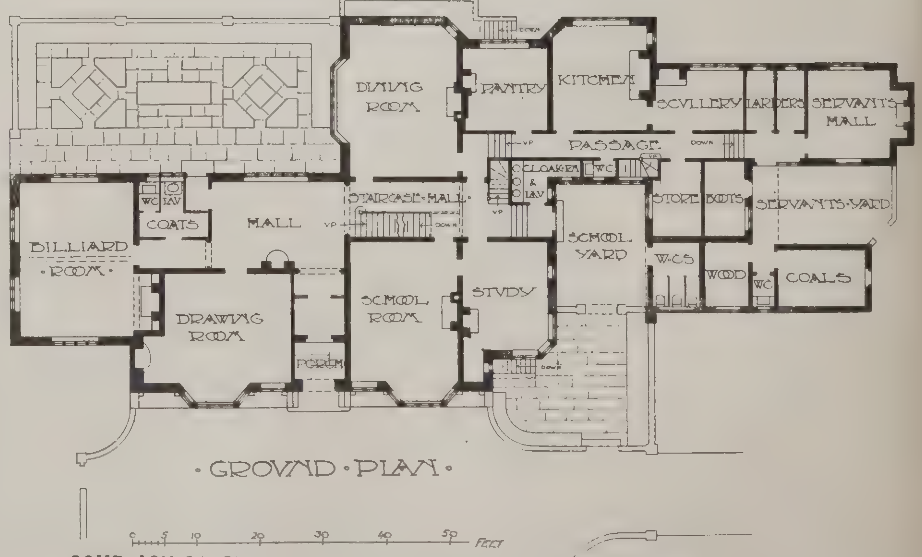


COMERAGH COURT, WOKING. CYRIL B. TUBBS AND A. A. MESSER, ARCHITECTS.

Views and Reviews.

Two Aid-Books.

In America what is known as a "pocket-book" (although generally larger than can be conveniently carried in the pocket, but yet sufficiently small to be a handy desk companion) is a much-favoured form for technical books, and the publishers of these two books now under review, namely, Messrs. John Wiley and Sons, of New York, deserve the thanks of the architectural and engineering professions for the great service they have done in publishing so many excellent handbooks of this description, got up in a most admirable way, well printed on good paper, with clear type and neatly bound in leather. These two additions to their other "pocket-books" or hand-books appeal to two different classes of readers, but they are worthy additions to any architectural library. They are both by the same author, namely, Mr. H. D. Richie, who is a superintendent of construction on United States Government Buildings, and author of a number of other excellent reference books.

The first hand-book, intended primarily for "superintendents of construction," or what we should call in this country clerks of works, includes a good deal of useful information that we do not find in English books intended for the same class of reader. There is no long dissertation about the duties of a clerk of works. The whole of the information provided is a comprehensive condensation of information, regarding almost all branches of building construction that comes within his ken, including particulars of how to set out a building, and hints upon workmanship that will be found of great service not only by clerks of works, but by architects and others. Specifications for various classes of work adopted in some of the United States Government Departments form one of the most valuable features of the book. American practice is somewhat different to that in England, but it will not be found that this hand-book contains much that is not of service, more especially as much of the information provided is of that advanced character which we have only recently begun to employ in buildings in this country. For instance, the illustrations of the various American systems of constructing fire-resisting floors will be found of much service. Valuable tables regarding square roots, cube roots, flow of water in pipes, weight of materials, strength of wire rope and chains, the force of wind, standard screw threads, &c., are not novel, but most useful, and render the book complete.

The other hand-book is intended more for the craftsman than for the architect. It contains such information as the setting-out of work, time saving tables for joinery, excavator's work, etc. Illustrations are given with descriptions showing how to tie or secure ropes to materials or to scaffolds, &c., for the purpose of hoisting into position, &c. The tables of timber sizes apply more to American practice than to English, as also those of iron or steel construction, but the strength and weight of materials and miscellaneous data are useful everywhere. Various recipes, hints, useful information, and mensuration tables are also included, with wages tables, &c. In a pocket at the end of the book a time-book is inserted in which the craftsman may record the time he has worked during the week, and the pay which he should receive. Extra copies of these time books can be obtained, and apparently it is intended that the craftsman should carry this reference book about with him upon the works. It is a good idea, and may be welcomed by the conscientious craftsman in this country.

"A Handbook for Superintendents of Construction, Architects, Builders and Building Inspectors," by H. G. Richey. Price 17s. nett.

"The Building Mechanic's Ready Reference: Carpenter's and Wood Worker's Edition," by H. G. Richey. Price 6s. 6d. nett. London: Chapman & Hall, Ltd.; New York: John Wiley & Sons.

A Book for the Estate Agent.

"The Country Gentlemen's Estate Book" is always a welcome annual, and this year's issue is well up to the standard of former years. The book contains articles by experts on all phases of estate management, and if it contains much information that is of an agricultural character and not particularly interesting to the majority of our readers, it nevertheless contains a good deal in the way of articles which have a direct bearing upon architecture and building construction. For instance, in the present volume there are articles on the following: Estate Law in 1906; The Problem of the Roads; Rural Factories; Co-partnership Housing Society in Country Districts (by Miss S. Furney); Hints for Estate Agents' Pupils; The Estate Agent (by Mr. Richard Henderson); Electric Lighting; Purification of Water by Sulphate of Copper; Lead Mining in Yorkshire; Small Buildings on Country Estates; Field Drainage; Levelling (by Mr. S. G. N. Mann); Water Supply; The Bournville Cottage Homes; Notes on Water Works Construction; Motive Power; and Burnettising Timber. The book is issued for members of the Country Gentlemen's Association, Ltd., and is sent free for the annual membership subscription of 10s. 6d., which also covers the cost of the "Estate Magazine," a monthly supplement to the "Estate Book." It is altogether remarkable value for the money, because the membership of the Association itself secures many privileges apart from these valuable publications.

"The Country Gentlemen's Estate Book, 1907," edited and compiled by William Broomhall. London: The Country Gentlemen's Association, Ltd., 24 and 25, St. James' Street

Plumbing.

In our issue for May 8th we reviewed the first divisional volume of a new book on "Plumbing," edited by Mr. G. Lister Sutcliffe. The second divisional volume now before us is, if anything, better than the first. It contains two contributions, namely, Section 4 on "Sheet Copper, Zinc and Iron" by an expert, and Section 5 "Water Supply" by Captain James Law, M.R.S.I., on the retired list of the Royal Engineers. The section on sheet copper contains much valuable information that we have not before seen recorded in any way. The chapter on "Zinc Roofing" is rather too short, as is also that on "Corrugated Iron Roofing," but a good deal of information is conveyed in the space. The section on water supply is most admirable. A large number of illustrations are included, and the subject, which is a large one, is dealt with very adequately, in what, after all, is a small space. Altogether this is the most comprehensive division of the book we have yet seen. Not only is the subject of water treated, but the collection and storage of rainwater, wells and pumps, motive power for pumps, water mains and fittings, domestic service pipes and fittings, water meters, cisterns, valves, fire hydrants, water softening and filtering apparatus, &c., all in turn. As a frontispiece to this second divisional volume, four further portraits are published of leading members of the trade, namely, Messrs. James Algie (Secretary of the Operative Plumbers' Benevolent Committee, Glasgow district), John Beal, of Hull, Edward Ellis Burns (Hon. Secretary of the Advisory Committee on Plumbing), and William Challoner of Blackpool. A short biography is included of each, and these portraits and particulars give a personal interest to the volume which is very welcome.

"The Modern Plumber and Sanitary Engineer," by sixteen specialist contributors, under the editorship of G. Lister Sutcliffe, A.R.I.B.A., M.R.S.I. Divisional volume 2. London: The Gresham Publishing Co., 34, Southampton Street, Strand. Price 6s. nett each volume.

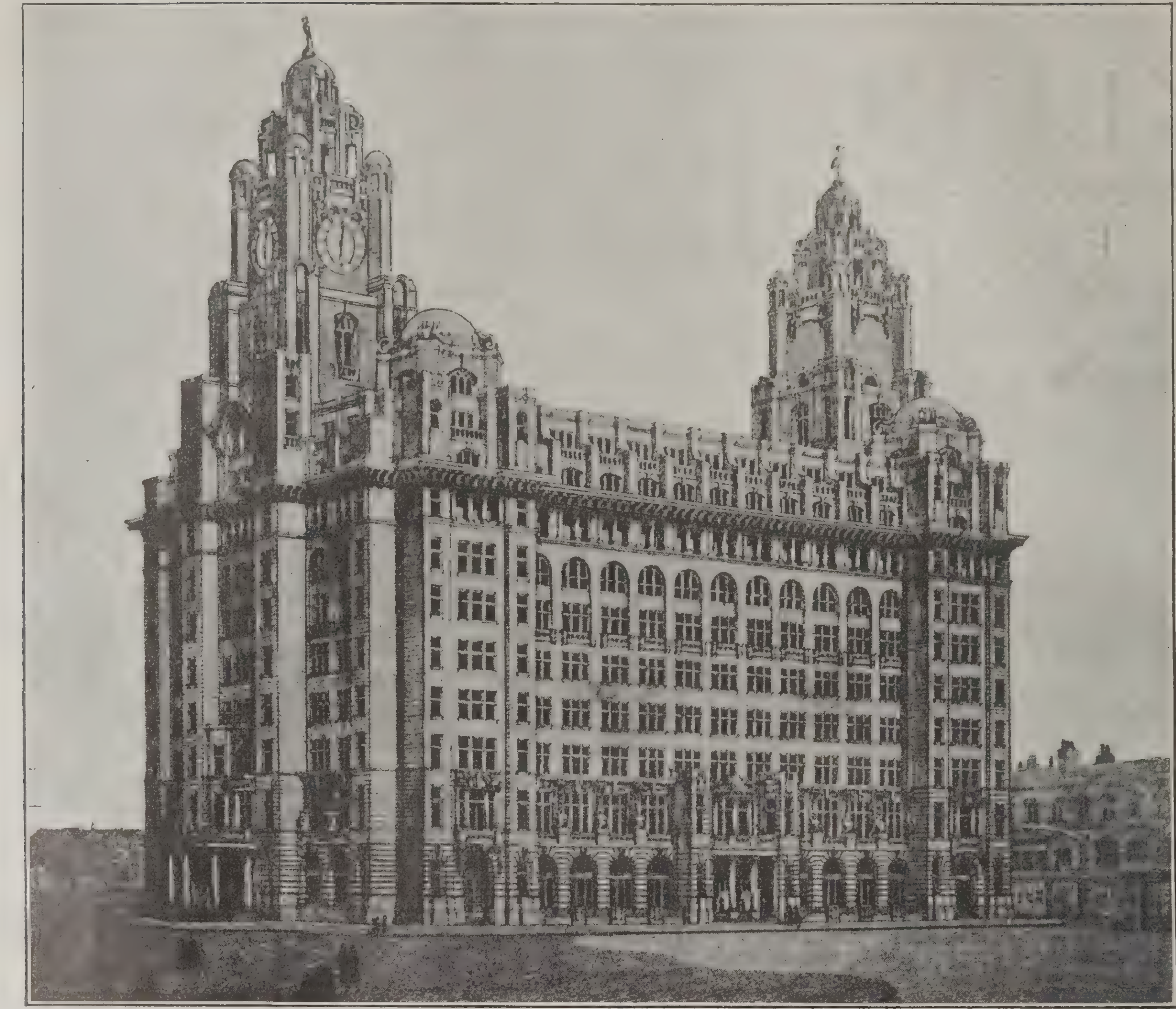
Zinc Work.

Messrs. Cassell have issued another of their series of useful little hand-books on technical subjects, namely, on "Zinc Working." This affords information as to how to set out patterns for zinc work, methods of covering roofs with zinc, the making of zinc spouting, &c. A good deal of more general information regarding zinc and zinc working could have been included with advantage, but still the information which is offered is serviceable and well worth the money.

"Zinc Working," edited by Paul N. Hasluck. London: Cassell & Co., Ltd., La Belle Sauvage, Ludgate Hill. Price 6d. nett.

Stone Arches.

This book by Professor Howe, of the Rose Polytechnic Institute, is undoubtedly a most important one. Professor Howe is an American authority of foremost rank in connection with the somewhat difficult subject of the applied mechanics of arch construction. The design of arches and arched bridges of recent years has been entirely modified by the elastic theory, for which Professor Howe has been one of those primarily responsible. Professor Howe, of course, some years ago, published a larger work on the subject, namely, his "Treatise on Arches," in which the entire subject was dealt with, formulas for special cases and conditions being given. The present book presents approximate formulæ and methods which are quite accurate enough for all practical purposes. The use of more comprehensive or rigid formulæ is not warranted, because the materials of masonry arches and the conditions are somewhat uncertain in character. The greater portion of the book is taken up with the solution of examples giving each stage in detail so as to be easily followed by an engineer who has not the time to review the theory of arches in a comprehensive manner. Graphical methods are utilised considerably, and render the text much easier to follow. In the States the name "masonry" includes brickwork construction, and we suppose this has led the author to feel at liberty to include the consideration of concrete and reinforced concrete arches, but to us it seems a little foreign to the chief title of the work. It is true not much space is given to these branches of the subject of arched design, but at the same time they are dealt with pretty thoroughly—perhaps not quite so thoroughly as Mr. Leffler's work which we reviewed on page 48 of our issue for April 24th. One very valuable feature of this book is the table given as an appendix providing data of about 500 arched bridges, arranged according to span. A reference is given in each case to where



PROPOSED NEW BUILDING FOR THE ROYAL LIVER FRIENDLY SOCIETY, PIERHEAD, LIVERPOOL.
W. AUBREY THOMAS, ARCHITECT.

further information can be obtained. By practical designers this table will be much appreciated. In the design of arched bridges precedent is a good thing to follow. Modern theory is, of course, much more accurate than the older theory, but engineers still feel a little bit nervous upon its all sufficiency, and, indeed, it is a little too soon to be certain that we are right. The information therefore included in this table enables a test to be put upon the accuracy of theoretical determinations. It is to be wished that full size tests had been carried out to destruction, or, at any rate, tests upon large size models of arches and arched bridges, but perhaps the deficiency may be repaired before many years have passed.

"Symmetrical Masonry Arches, including Natural Stone, Plain Concrete and Reinforced-Concrete Arches," by Malverd A. Howe, M.Am.Soc.C.E. London: Chapman & Hall. New York: John Wiley & Son. Price 10s. 6d. nett.

R.I.B.A. Council Resignations.—Mr. J. S. Gibson, Mr. Alfred W. S. Cross, Mr. C. E. Mallows and Mr. H. V. Lanchester have resigned their seats on the Council of the Royal Institute of British Architects for the remainder of the session.

Shipbuilding Yard.—The contract for Messrs. Harland & Wolff's engineering works at Southampton Docks has been obtained by the Waring-White Building Co. The estimated cost is over £30,000.

ROYAL LIVER BUILDING, LIVERPOOL.

The new building for the Royal Liver Friendly Society, which is proposed to be erected on a portion of the George's Dock site at the Pierhead, Liverpool, adjoining the new Dock Offices, has excited considerable local comment. At a recent meeting of the Liverpool City Council the matter came up for discussion, an attempt to have the design modified being defeated by an overwhelming majority. The Dock Board raised the point that the new proposed Royal Liver building, irrespective of its own architectural quality, would, by its height and situation, completely spoil the fine architectural effect of the Dock Board offices. Its height as approved by the City Council is to be 146ft. measured from the pavement to the top of the main cornice, while the two towers at the west and east ends will rise to 290ft.; the Dock Board offices are 215ft. high to the summit of the dome. The immense size of the building suggests an American skyscraper. The site upon which it is to be erected is one of the plots left available by the abolition of the George's Dock. The Dock Board offices are on the south side, the middle site being reserved for the still-hoped-for Custom House and baths, and the third section, on the north side, for the Royal Liver building. The cost of the land for this building is given at £70,000, the cost of erection being estimated between £250,000 and £300,000. The area will be about an acre and a quarter. The frontage to Water Street is 290ft., and to the river 173ft. The building is to be constructed on the steel-frame principle and faced with grey Scottish granite. It will comprise ten storeys. It is expected that the Royal Liver Friendly Society will require only about one-quarter of the total accommodation for its own use, commencing with the fourth storey: the remainder of the space will be let in suites of offices. The architect is Mr. W. Aubrey Thomas, of Liverpool. We are indebted to the "Liverpool Daily Post and Mercury" for our illustration.

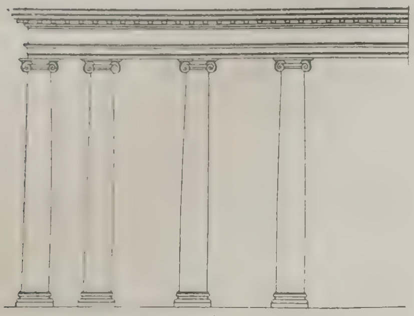
Gloucestershire Architectural Association.—At a meeting of this Association held on Thursday last at Gloucester (Mr. F. W. Waller, president, in the chair) Mr. Edmund J. Cullis read a paper on reinforced concrete, with special reference to the Hennebique system.

The Amalgamated Building Businesses of Messrs. George Trollope & Sons and Colls & Sons did sufficiently well in the past year to enable the directors to recommend a balance payment of 5 per cent., making 7½ per cent. for the year, against 5 per cent. for 1905. To special reserve for workmen's compensation £3,000 is transferred, and to general reserve £1,398, leaving a balance of £8,865.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Eighteenth Series.)

CLASS A (ARCHITECTURE).



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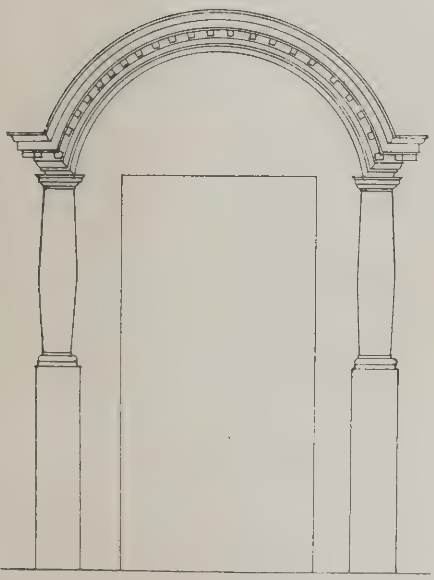

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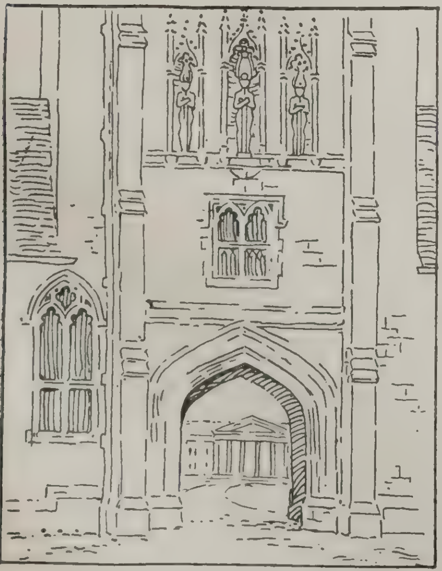


A 50

This competition has been instituted with the object of increasing the circulation of The Builders' Journal by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of The Builders' Journal offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Price.—£10

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.

2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.

3. All solutions must be addressed to the Editor of The Builders' Journal, 6, Great New Street, London, E.C., the envelopes being marked "Competition."

4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.

5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.

6. No persons directly or indirectly connected with the staff of The Builders' Journal, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.

7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.

8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.

9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.

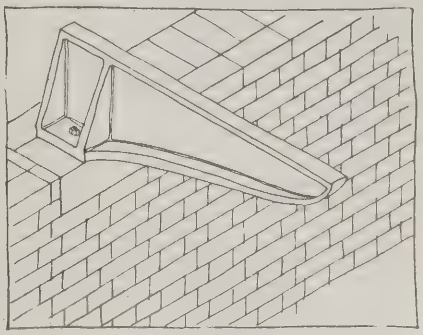
10. Any volation of these rules will entail disqualification.

11. The Editor's decision on every matter will be final.

(*For Coupons see page xxxi.*)

Copies of "The Builders' Journal" *containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

CLASS B (BUILDING).



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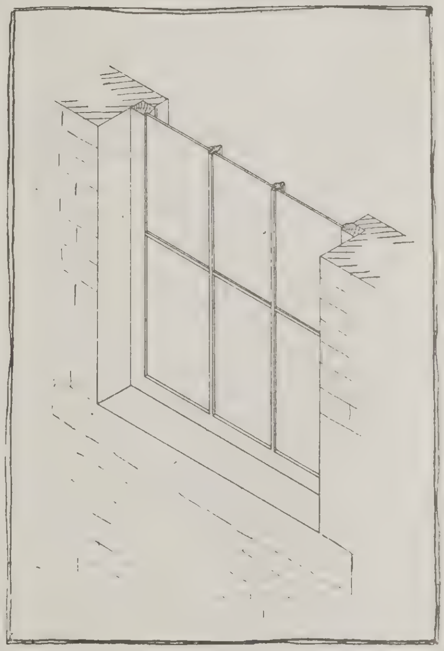

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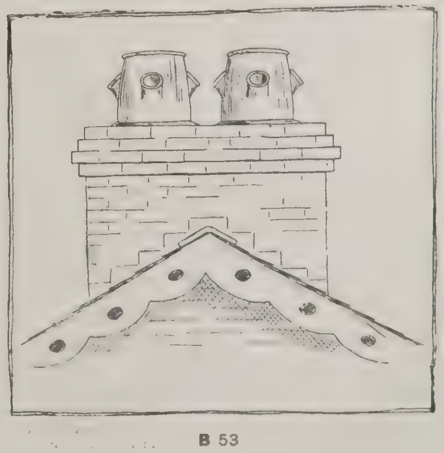

B 53

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Abingdon.—For the erection of a new wing at Culham Diocesan Training College, for the Trustees. Mr. J. G. T. West, M.S.A., architect, The Knowl, Abingdon :—

Smallbone, Streatley	£1,465
Brasher, Wallingford	1,420
Thatcher, Abingdon	1,319
Organ Bros., Oxford...	1,280
Kingerlee & Sons, Oxford	1,267
Buckle,* Abingdon	1,245

* Accepted.

Bodmin.—For the erection of a private residence and certain other works in Priory Avenue, for Mr. A. C. Pomery. Mr. William J. Jenkins, architect, Bodmin :—

E. Dorrent, Tintagel	£2,391	4	0
S. Trehane, Liskeard	1,700	0	0
W. E. Bennett	1,685	0	0
Shelley & Sons	1,523	0	0
C. Ham	1,460	0	0
Brown & Son*	1,435	0	0

* Accepted.

Rest of Bodmin.

Cardiff.—For the extensions of the Infirmary to form a new out-patients' department. Mr. Edwin Seward, F.R.I.B.A., architect, Queen's Chambers, Cardiff :—

S. Shepton & Son	£10,130
G. Couzins & Son	9,650
F. Bond, Canton	9,600
G. Hallett	9,500
W. Williams, Splott	9,500
W. King & Son, Whitchurch	9,226
Gough Brothers	9,150
G. Beames	9,030
D. Davis & Son	8,990
Knox & Wells, Roath	8,989
E. R. Evans & Brothers, Cathays ...	8,895
F. Small, Roath...	8,850
D. W. Davies	8,772
J. Allan & Son, Cathays	8,770
W. Thomas & Co.*	8,483

* Accepted.

Rest of Cardiff.

Devonport.—For the erection of a new ward block at the infectious diseases hospital, near North Prospect, for the Town Council. Mr. J. F. Burns, borough surveyor. Quantities by Mr. S. W. Haughton, Plymouth :—

W. G. Hoskin, Plymouth	£1,704	2	2
Pethick Brothers, Plymouth ...	1,697	10	0
M. J. Allen, Plymouth	1,696	11	9
J. Cockerill, Devonport	1,683	14	0
Pearce Brothers, Plymouth ...	1,598	0	0
W. G. Perkins, Devonport	1,581	10	6
Matcham & Co., Plymouth ...	1,538	0	0
W. E. Blake, Plymouth	1,516	0	0
F. J. Stanbury, Devonport... ...	1,501	17	0
A. N. Coles, Plymouth	1,491	2	6
S. Roberts,* Plymouth	1,489	7	6

* Accepted.

Hatton (Warwick).—For alterations and additions to Hatton House, near Warwick, for J. P. Arkwright, Esq. Mr. C. M. C. Armstrong, architect, Warwick :—

G. F. Smith & Sons, Leamington ...	£1,815
Collins & Godfrey, Tewkesbury	1,758
J. Parnell & Son, Rugby*	1,722
T. Broad, Ltd., Malvern	1,643

* Accepted.

Hull.—For alterations and additions to the Williamson Street School, for the Education Committee. Mr. Joseph H. Hirst, city architect, Town Hall, Hull :—

G. Jackson & Sons	£4,469	7	0
H. T. Arnott	4,345	13	0
Hull General Builders...	4,312	2	3
G. H. Panton	4,300	0	0
G. Houlton & Sons...	4,240	0	0
F. Singleton	4,170	0	0
M. Harper	4,134	0	0
T. Goates*	4,125	0	0

* Accepted.

All of Hull.

London, S.W.—For the erection of a hall at the Tooting Home, Church Lane, for the Guardians of Wandsworth Union :—

R. A. Jewell, Wandsworth	£3,116
Page & Co., Herne Hill	3,050
J. W. Hallett, Tooting	3,049
Martin, Wells & Co., Vauxhall	2,995
Higgs & Hill, South Lambeth	2,984
Myall & Upson, Ilford	2,980
Patman & Fotheringham, Islington ...	2,973
J. & W. Drake, Hammersmith	2,967
F. G. Minter, Putney	2,963
Chadwell Heath Joinery Co., Chadwell Heath	2,950
J. Smith & Son, South Norwood ...	2,945
W. Lawrence & Son, Waltham Cross	2,944
E. Lawrance & Sons, London	2,940
T. Holloway, Wimbledon Common ...	2,860
F. & H. F. Higgs, Herne Hill	2,859
B. E. Nightingale, London	2,859
H. H. Hollingsworth, Peckham... ...	2,849
Courtney & Fairbairn, Camberwell ...	2,847
Cropley Brothers, Epsom	2,847
E. B. Tucker, Battersea	2,828
F. Eaton, Upper Tooting	2,828
E. Streather, South Croydon...	2,804
L. F. Lamplough, Notting Hill ...	2,781
A. Leather, Wandsworth	2,772
F. & G. Foster, Norwood Junction ...	2,762
Johnson & Co., Wandsworth Common	2,760
Wallis & Sons, Maidstone	2,734
Moss & Co., Southend-on-Sea	2,725
Cook & Sons, Crawley	2,712
Garrett & Son, Balham Hill	2,696
J. Barker & Co., Kensington	2,687
Spencer-Santo, Kensington	2,685
Pasterfield & English, Streatham ...	2,599
E. Wall, Lower Tooting	2,590
Hyde & Co., Norwood Junction	2,570
Fitch & Cox,* Enfield	2,514

* Accepted.

London, E.—For additions to Field Road U.M.F. Church, Forest Gate. Messrs. George Baines & Son, 5, Clement's Inn, Strand, W.C., architects :—

E. W. Wordley	£1,465	8	10
H. J. Carter	1,438	0	0
Charles North	1,386	0	0
Geo. J. Hosking	1,329	0	0
Sands & Burley	1,250	0	0
Battley, Sons & Holness*	1,192	0	0

* Accepted.

London, S.W.—For alterations to St. Clement's Parish Hall, Fulham Palace Road, S.W. Messrs. Monson & Sons, architects, Acton Vale, W., and at 22, Buckingham Street, Adelphi, W.C. :—

Adamson & Sons, Putney, S.W.	£3,366
Patman & Fotheringham, Theobalds Road, W.C.	2,821
C. Johnson, Hammersmith	2,665
J. Christie, Shepherd's Bush	2,649
J. Howell, Putney, S.W.	2,620
Bendon, Ltd., Hammersmith	2,505
Bulled & Co., Croydon	2,497
W. Blackburn, Chiswick...	2,300
Godson & Sons, Kilburn, W.	2,300
The Southern Building Co., Clapham Road, S.W.	2,175
J. Simms,* Fulham, S.W.	1,983

* Accepted.

Pocklington (Yorks).—Accepted for the erection of a Council school to accommodate 250 children, for the East Riding of Yorkshire C.C. :—

T. C. Grant, Pocklington £2,512

Porthcawl (Glam.).—Accepted for the erection of a new Council school, for the Glamorgan C.C. Mr. D. Pugh Jones, county architect (Eastern Division), Cardiff :—

S. Shail, Llandaff £3,158 10 8

St. Nicholas, near Cardiff.—Accepted for the erection of model house and buildings. Mr. C. H. Kempthorne, architect, Cardiff :—

Ernest T. Bevan, Penarth.

West Heath (near Congleton).—For the erection of an infectious diseases hospital, for the Congleton and District Joint Hospital Board. Messrs. Alfred Price & Son, architects, Elworth, Sandbach :—

Pickstock & Royle, Holmes Chapel	£8,196	0	0
J. Stringer, Sandbach	7,960	0	0
S. Jackson, Ltd., Smallwood ...	7,667	16	0
F. Matthews, Nantwich	7,498	0	0
W. Worrall, Congleton	7,250	0	0
J. Worrall, Congleton	7,133	6	9
T. & E. Cooke, Congleton	6,976	0	0
Birchall Brothers,* Middlewich	6,820	0	0

* Accepted.

Wolverhampton.—For extensions to the electric lighting station at Commercial Road, for the Electricity Committee. Mr. George Green, borough engineer :—

F. J. Smith, Wednesbury	£4,069	10	0
T. & G. Perry	3,285	15	0
F. L. Jones	2,987	0	0
T. & S. Ham	2,980	0	0
H. Willcock & Co.	2,965	0	0
G. Cave & Son	2,933	0	0
H. Gough & Son*	2,900	0	0

* Accepted.

Overtime in the Building Trades.—The Sub-Committee of the Parliamentary Committee of the Trade Union Congress has made arrangements for the next Conference on overtime in the building trades to be held at Caxton Hall, London, on June 7th. The object of this meeting is to carry out a resolution of the Congress pressing on the Trade Unions (in order not to add to the unemployed problem) the necessity of agreeing with the employers to abolish systematic overtime.

R.I.B.A. Visit to Edinburgh.—This will take place from Thursday, July 4th, to Saturday, July 6th. On July 4th the Lord Provost and magistrates will hold an evening reception in the City Chamber; on July 5th visits will be paid to Edinburgh Castle, St. Giles' Cathedral, Parliament Hall, Holyrood Palace and Chapel, and the Edinburgh Architectural Association's exhibition of drawings and photographs at the Royal Scottish Academy, followed by the annual dinner of the Institute in the evening at the Caledonian Station Hotel; and on July 6th visits will be paid to Roslin Chapel and Castle, and to George Heriot's Hospital School, Lauriston.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans...	per qr.	1	11	0	1	13	0
Clover, best...	per load	4	7	0	4	7	6
Hay, good	do.	4	0	0	4	5	0
Sainfoin mixture	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

METALS.

Standard Copper	per ton	100	0	0	101	0	0
Do. Strong sheets ...	do.	118	0	0	120	0	0
Lead, soft foreign... ...	do.	19	17	6	20	5	0
Do. English	do.	20	5	0	20	10	0
Do. pipes...	do.	23	7	6	23	10	0
Do. sheets	do.	22	17	6	23	0	0
Galvanised Corrugated sheets	do.	13	15	0	13	17	6
Spelter G. M.	do.	24	15	0	25	0	0
Angles, Scotland	do	7	5	0	7	7	6
Bars, do.	do.	8	0	0	8	2	6
Marked bars, Staffs. ...	dc	8	17	6	9	0	0
Common bars, do ...	do.	6	17	6	7	0	0
Angles, M'boro.	do.	6	17	6	7	0	0
Joists do.	do.	6	15	0	6	17	6
Angles, Midlands	do.	7	2	6	7	5	0
Joists do.	do.	7	2	6	7	5	0
Girder plates, Midlands ...	do.	7	17	6	8	0	0
Angles, Foreign, c.i.f. Thames	do.	7	3	6	7	5	0
Tees do. do. do	do.	7	5	0	7	7	6
Joists, do. do. do.	do.	6	7	6	6	10	0
Channels do. do. do.	do.	6	10	0	6	12	6
Tin, Foreign	do.	189	0	0	190	0	0
Do. English ingots ...	do.	193	0	0	194	0	0
Zinc, sheets, Silesian, ...	do.	30	0	0	30	10	0
Do. do. V.M. ...	do.	30	10	0	31	0	0

TIMBER.

Deals, Archangel, Yellow, 1st, 4×11	per std.	21	0	0	—
Do. do. do. 3rd, 3×9	do.	10	10	0	—
Do. Kalix & Lulea, Yellow, 1st, 4×11	do.	12	15	0	—
Do. do. do. do. 4×9	do.	12	5	0	—
Do. do. do. do. 3×8	do.	10	10	0	—
Do. do. do. do. 3×7	do.	10	5	0	—
Do. do. do. do. 2½×9	do.	11	5	0	—
Do. do. do. do. 2½×7	do.	10	10	0	—
Do. do. do. 2nd, 2½×7	do.	9	10	0	—
Do. Kola, Yellow, unsorted, 2½×8	do.	10	0	0	—
Do. do. do. do. 2½×7	do.	10	10	0	—
Do. Kemi, Yellow, 1st & 2nd, 4×7	do.	9	10	0	—
Do. Nederkalix & Lulea, Yellow, 1st, 4×9	do.	12	15	0	—
Do. do. do. do. 3×7	do.	10	5	0	—
Do. do. do. do. 2½×9	do.	11	0	0	—
Do. do. do. 2nd, 3×7	do.	9	0	0	—
Do. do. do. do. 2½×9	do.	9	10	0	—
Do. do. do. 3rd, 3×9	do.	8	15	0	—
Do. Nederkalix, Yellow, dry 1st, 3×9	do.	11	5	0	—
Do. Quebec, Spruce, 1st, 3×9	do.	12	15	0	—
Do. do. Bright Spruce, 2nd, 3×9	do.	9	10	0	—
Do. Riga, White, unsorted, 3×10	do.	8	10	0	—
Do. do. do. do. 3×8	do.	8	0	0	—
Do. Skelleftea, Yellow, 1st, 3×4	do.	9	15	0	—
Do. do. do. 2nd, 2½×7	do.	9	5	0	—
Do. do. do. 3rd, 4×9	do.	10	10	0	—
Do. do. do. do. 3×11	do.	9	15	0	—
Do. do. do. Inf., 5th, 3×7	do.	7	15	0	—
Do. do. Mixed Yellow, 4×9	do.	11	15	0	—
Do. St. Petersburg, Yellow, 1st, 3×9	do.	13	10	0	—
Do. Soroka, Yellow, 4th, 3×9	do.	9	0	0	—
Do. St. John, Spruce, 3×8	do.	8	0	0	—
Do. do., Bright Spruce, 1st, 2nd, 3rd, unsorted, 2½×7	do.	7	15	0	—
Do. Storfors & Bure, Yellow, 2nd, 2½×7	do.	9	10	0	—
Do. Wartsala, Yellow, 1st & 2nd, 2½×7	do.	9	10	0	—
Battens, Abo, Yellow, unsorted, 2×5	do.	8	10	0	—
Do. do. White, unsorted, 2×4	do.	8	10	0	—
Do. Gefle, Yellow, Inf., 5th, 2×8	do.	8	5	0	—
Do. do. do. do. 2×7	do.	8	0	0	—
Do. do. do. do. 2×6	do.	7	10	0	—
Do. do. do. do. 2×5	do.	7	10	0	—
Do. do. do. do. 2×4	do.	8	10	0	—
Do. Kalix & Lulea, Yellow, 1st, 2×9	do.	11	5	0	—
Do. do. do., 2nd, 2×2	do.	10	0	0	—
Do. do. do. do. 2×8	do.	9	15	0	—
Do. do. do. do. 2×5	do.	8	15	0	—
Do. Kovda, Yellow, 3rd, 2×9	do.	11	5	0	—
Do. do. do., 4th, 2×9	do.	9	0	0	—
Do. Lulea, Yellow, 1st, 2×5	do.	9	10	0	—
Do. Lovisa, Yellow, 1st & 2nd, 2×4	do.	9	15	0	—
Do. Nederkalix & Lulea, 2nd, 2×4½	do.	8	10	0	—
Do. Storfors & Bure Yellow, 2nd, 2×5	do.	8	15	0	—
Do. Skutskar, Yellow, unsorted, 2×5	do.	8	10	0	—

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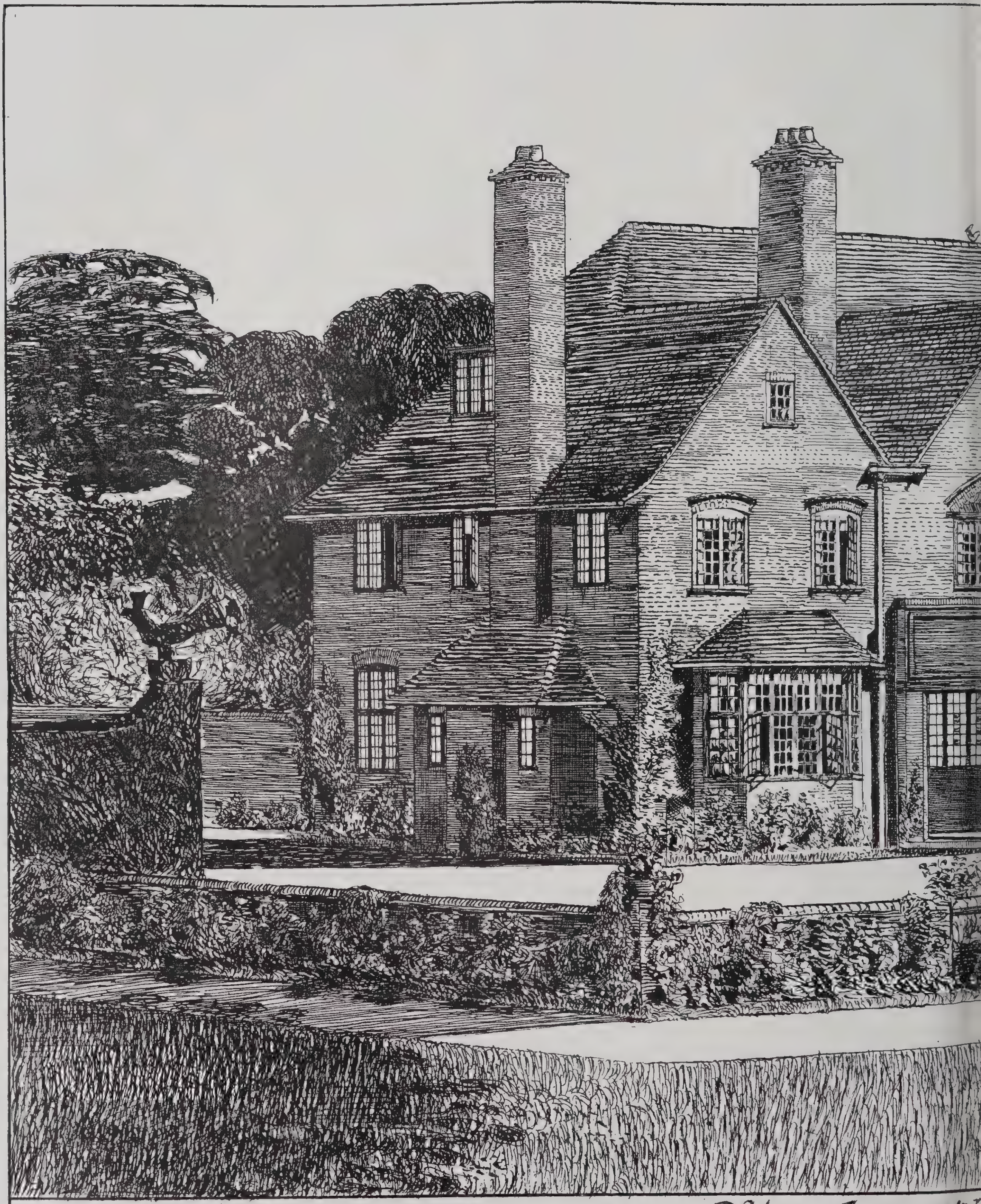
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, June 12th, 1907.



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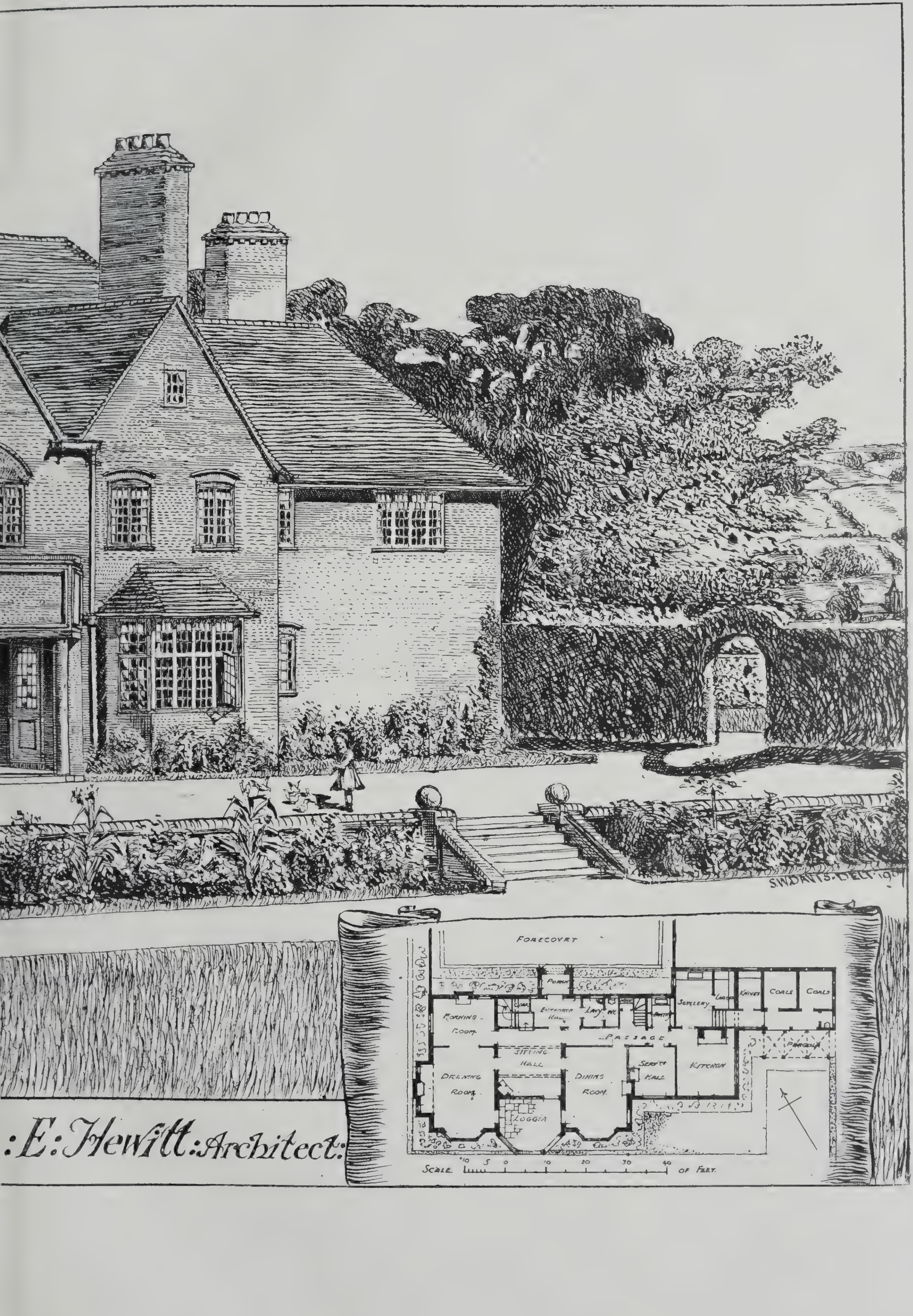
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COALS
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MORNING ROOM
PASSAGE
SITTING HALL
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June 12, 1907. Volume 25, No. 644

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

Notices.

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Perverted Principles. ONE of the results of modern changes in the building art has been the tendency to take all discussion back to first principles. But a principle is only a means to an end, and the architectural needs of the world, especially in great cities, are so many and insistent that we find ourselves daily confronted with buildings which appear either to confute some old principle or to represent a new one. In all these matters it is remarkable how enormous has been the influence upon public taste of words and phrases. And until very recently their influence has been felt among architects also. Let us take a few. Pugin said that men should build "ornamented construction, not constructed ornament." The words are true, but how often have they been perverted, sometimes to force the showing of features that old Gothic builders used, and to unduly emphasise them, sometimes to reject ornament that would have beautified the building. As a matter of fact, Pugin wrote under the influence of natural irritation at the vagaries of some revivers and restorers of his day who had not studied their Gothic as thoroughly as has since been done. Like other aphorisms, it requires to be used with judgment. Far more widely known, however, are Milton's famous lines in the *Penseroso*: "And storied windows richly dight, cast a dim, religious light." It may safely be said that the effect of this famous couplet has been to make all our churches dark; there are probably few words in our literature so often quoted: it is assumed that Gothic windows existed originally, and should still be designed, for the display of coloured glass only, from which the deduction is drawn that the building is unfinished so long as a single window remains unfilled with it. The part properly played by stained and painted glass is a great one, and needs no words from us; there are places, however, where windows—even Gothic ones—are better left plain or filled only with light or silvery glass. And the influence of the words extends far beyond Gothic, and is responsible for many dark corners in Renaissance buildings. There is a notable instance of this in St. Paul's Cathedral, where much of the controversy upon the mosaic decoration might have been avoided had the eastern end of the building been lighter. The general effect of the interior, noble as it is, is marred by excessive sombreness, which, as we approach the apse, becomes gloom, whilst the brilliant colour effects of the mosaics are confused by the additional colour from the glass. It is at least questionable if St. Paul's be well suited to stained glass; the western end also having been darkened by the two chapels which were forced upon Wren by outside influence, chapels whose rich detail again is almost lost in obscurity. What shall we say, too, of Disraeli's jibe at our fine London squares, that they resembled "a large family of dull children, with Portman Square and Portland Place for their respectable parents"? Surely this is very unjust; it may be doubted if any city can show such a succession of stately gardens and noble trees; more might have been done by way of statuary and "garden architecture," or an occasional fountain to embellish them, but they are exceedingly dignified, and their style, which is mainly Georgian, is once more coming into favour.

Crosby Hall. IT would, indeed, be regrettable if Crosby Hall, Bishopsgate, were demolished. Everyone seems anxious to preserve such a historical building, which is also of considerable interest as an example of a medieval merchant's house. The City Corporation is still considering ways and means of preventing its destruction, and the London County Council is also working to the same end, for the Local Government Records and Museums Committee reported yesterday that it is giving the matter careful consideration, and proposes to take an early opportunity of viewing the premises. There have been various statements as to the antiquity of the building, and though there is much that is of modern date, the Great Hall appears to be original, dating from about 1470. We abstract a few facts recorded in the report to the Council. The first reference to the site is made in 1466, when John Crosby, an eminent grocer and wool-stapler, obtained of the prioress of the Convent of St. Helen a lease for 99 years of certain lands and tenements adjoining south-west of the priory precinct. On this site Stow says that Crosby erected a new house "of stone and timber, very large and beautiful, and the highest at that time in London." There can be little doubt that, at any rate, the existing great hall was built at that time. Crosby died in 1475, and in 1483 Richard III. was in possession. In 1556 considerable additions were said to have been made. Crosby Place escaped the great fire of 1666, but about 1676 nearly the whole of the building, apart from the great hall, was burnt down. The hall was in 1672 converted into a Nonconformist meeting-house, and was so used until the year 1769. From 1810 to 1831 it was let for a packer's warehouse. On the lease running out in the latter year the building was in danger of demolition. Public interest was aroused, however, and subscriptions were invited for the purpose of securing an interest in the hall on a term of lease and for restoring its architectural details. The freeholder granted the Restoration Committee a lease for 99 years. The first stone of the exterior restoration of the building was laid in 1836, and the hall reopened on 27th July, 1842. From that year it was leased to the Crosby Hall Literary Institute, and on the institute coming to an end in 1860 the freeholder repurchased the lease. For the next seven years the hall was used as a wine merchant's warehouse, for which purpose damaging alterations were carried out. In 1868 it was restored, and has since been used as a restaurant.

HADFIELD ELEMENTARY SCHOOL COMPETITION.

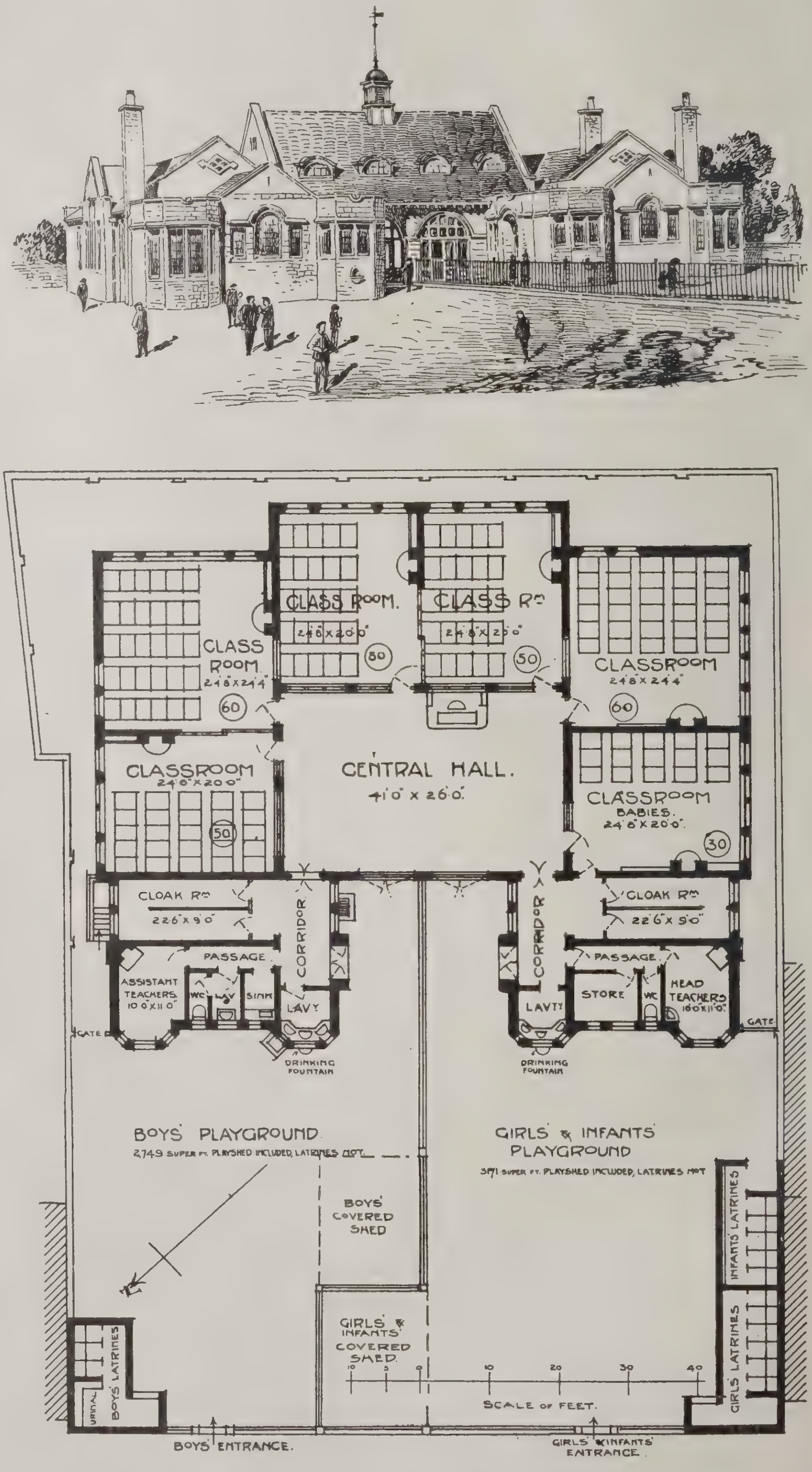
The Borough of Glossop Education Committee advertised recently that they were prepared to receive plans for a new elementary school at Hadfield Road, Hadfield, in competition from architects within a radius of 30 miles from their town hall. Although the competition was a limited one, yet a liberal response was made by the profession. Manchester was within the area, and many of the 49 designs ultimately received were forwarded from that city. The conditions stated that the proposed public elementary school would have to accommodate 300 scholars—100 infants and 200 other children—with central hall and teachers' room. It was suggested that rooms for cookery and woodwork instruction should be shown on the plans, though the committee had not definitely decided to erect these special rooms. Competitors had to state in their report the cost per head for which they could carry out their designs. The award had just been made by the Hadfield Council School sub-committee, assisted by Mr. J. H. B. Grindrod, His Majesty's Inspector of Schools, and Mr. G. H. Widdows, architect to the County of Derby Education Committee.

After inspecting the designs, the result is only fairly satisfactory, and it would have been better had only one professional assessor adjudicated on the schemes. Some clever designs have been placed out of court owing to the sets being mounted on strainers, instead of being sent in flat or between cardboard; whereas the successful scheme does not comply with the Board of Education Rules or the conditions on many points. These have evidently been considered of less importance than departing from a small rule regarding the finish of the drawings.

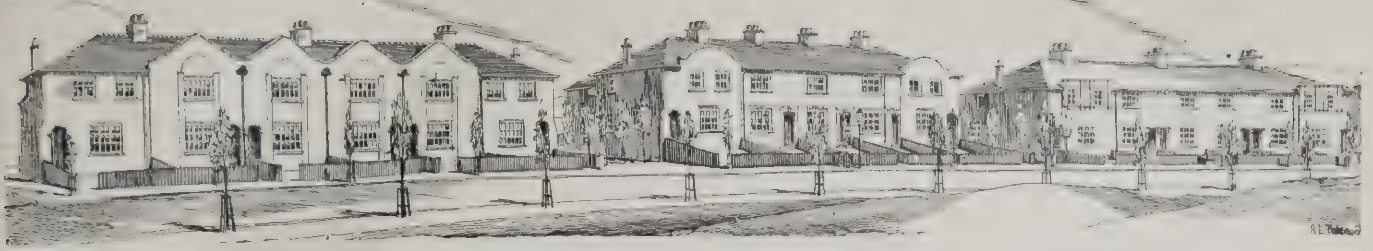
The accepted design was submitted by Messrs. Ogden and Hoy, of Examiner Buildings, Manchester. The plan is a balanced one, though not so compact as some of the other schemes, and occupies a greater portion of the limited site than is absolutely necessary. Apart from the balance, there are many points which are against this scheme. The conditions did not state that the competitors had right of light over the side and back boundary lines. Except the front elevation, the adjoining narrow passages can hardly light the classrooms in the event of any future buildings being erected adjoining the school and intercepting the light. This point has ruled almost all the other plans, and, where a school building like this is surrounded by cottage property and rear ashbins and conveniences, it can hardly be called ideal, from a hygienic point of view, to have classrooms looking into cottage backyards, and subject to direct smells and air contamination. Playground area for the children is very limited, being less than half the 30ft. super. per child asked for by the Board of Education Rules. The narrow passages surrounding the school buildings are wasteful, and might have been added to the playgrounds.

Internally, the arrangement of cloakrooms requires revising; the girls' and infants' room does not scale according to the dimensions, and has to accommodate pegs for about 100 girls and 100 infants; while the boys' cloakroom is the same area, though only 100 boys will use the room, and they, as a rule, pocket their caps, while the girls and infants have many cloaks and umbrellas, requiring larger cloakroom space. The babies' room for 30 is the same area as the mixed school classroom for 50, and the infants' classrooms could have been more disconnected with separate entrance and cloaks. An important feature of the building is the central hall, which is provided on one of its long sides with large windows, the lower part forming swing doors and opening into the boys' and girls' playgrounds respectively, so that the scholars may march direct from the hall to the playground during drill lessons. This is one of the ideas which have lately been incorporated into the new schools in the county of Derby. Both the manual training and cookery centre were shown detached and fronting the main road.

All the elevations are designed in a simple manner suitable for the district, where stone is the principal building material. The window panes are rather small, though they looked well in the coloured perspective which accompanied the design.



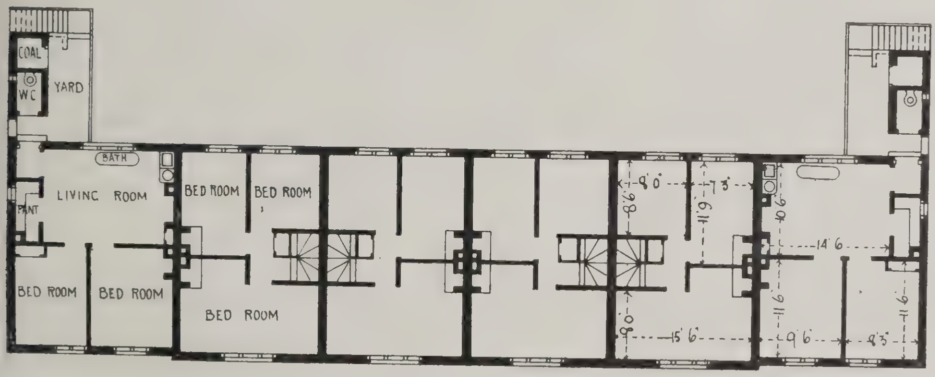
ELEMENTARY SCHOOL, HADFIELD, NEAR GLOSSOP, DERBYSHIRE: DESIGN PLACED FIRST.
OGDEN AND HOY, ARCHITECTS.



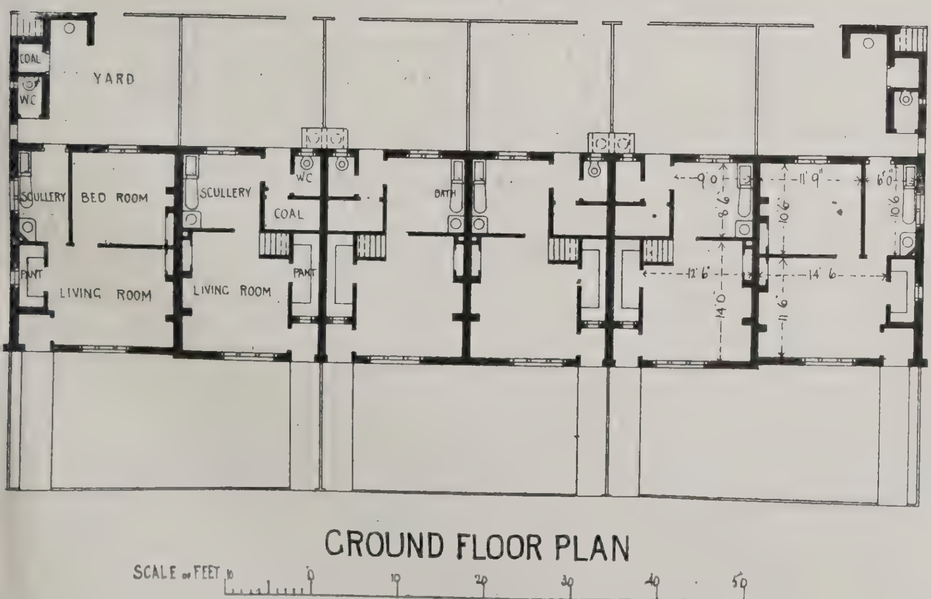
WORKMEN'S HOUSES, HIGH WINCOBANK, SHEFFIELD. H. L. PATERSON, A.R.I.B.A., ARCHITECT.

WORKMEN'S HOUSES, SHEFFIELD.

The workmen's houses illustrated on this page are proposed to be built in Wincobank Avenue, Sheffield, on the Corporation estate, which adjoins the site of the contemplated Sheffield and North Midlands Model Cottage Exhibition. The scheme will consist of three blocks, each containing a pair of flats at either end, with two-storeyed cottages occupying the remainder of the block. There will be twenty-three dwellings in all. The Sheffield Corporation believe that by combining houses of varying accommodation in this way provision will be made for tenants who have no family, or one child only, and who may thus obtain the accommodation they need without being compelled to take lodgers. Each of the two-storeyed houses contains living-room, scullery, three bedrooms, and the usual offices: while the ground-floor flats contain living-room, scullery and one bedroom, and the first-floor flats living-room, and scullery combined, with two bedrooms. In each dwelling a bath is provided, hot water being supplied from the copper. Local stock bricks and Welsh slates will be used. The whole of the ground floors will be of concrete, and the upper floors of joists and boards, except in first-floor flats, where breeze concrete with steel bars will be used. Gardens for the use of tenants will be provided in the rear, separated from the yards by a 5ft. passage. The amount of land, including that on which the houses stand, but exclusive of roads, is calculated on the basis of 200 sq. yds. to each two-storeyed house, and 138yds. to each single flat. The cost of the buildings is estimated at £2,997. The work will be carried out by Mr. W. Malthouse, of Sheffield, from the design and under the superintendence of Mr. H. L. Paterson, A.R.I.B.A., of Sheffield.



FIRST FLOOR PLAN



GROUND FLOOR PLAN

WORKMEN'S HOUSES, HIGH WINCOBANK, SHEFFIELD.

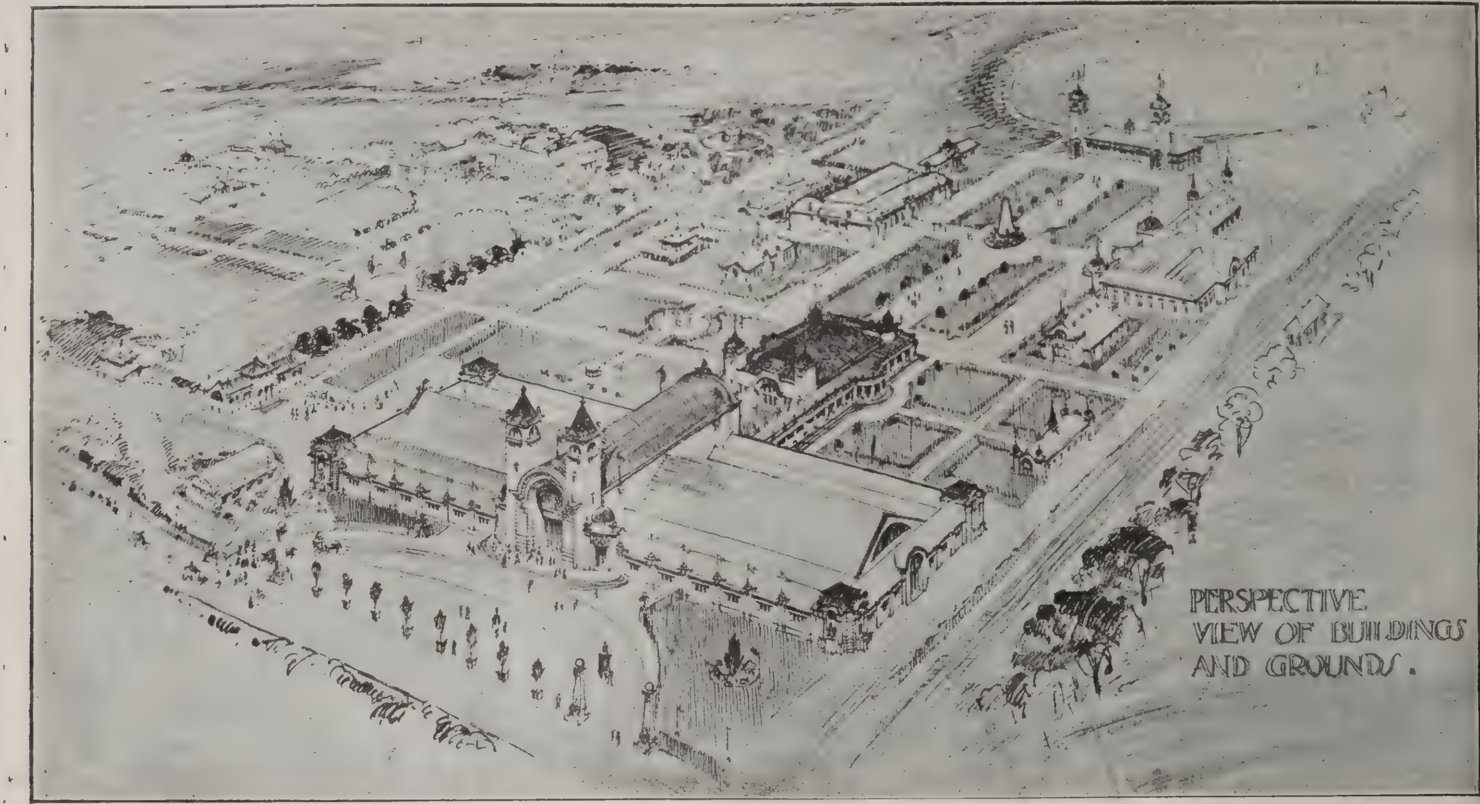
Notes on Competitions

Houses for the Poor, Kingstown.

A "Memorandum" has been issued in connection with the competition for houses for the very poor at Kingstown. For the most part it consists of replies to enquiries about the site, by-laws, &c., but at the end is given the following summary of prices, at which certain classes of work have recently been executed under building schemes for the urban council:—

	s.	d.
Excavation for foundations, part return, fill and ram and remove surplus earth, price to include necessary bracing of sides of trenches as required measured nett width of concrete foundations ....per cub. yd.	0	8
4-in. diameter extra-glazed earthenware sewer pipes laid on and including a bed of 7 to 1 concrete, 9-in. by 4-in. timber cased both sides, jointed with gaskin and cement. Price also to include for excavation to an average depth of about 2½ft., bracing sides of trenches, refilling and ramming and removing surplus earth per ft lin.	1	6
Cement concrete 7 to 1 in footings and foundations ....per yd. cube	12	0
Cement concrete 5 to 1 in rising walls, exclusive of timber casings......per yd. cube	15	0
Brickwork in walls of superstructure per yd. cube	24	0
Brickwork in chimney shafts......per yd. cube	25	0
4½-in. stock brickwork in cement mortar partitions ....per yd. super.	3	0
6-in. thick cement concrete 4 to 1 at first-floor level, finished with level floated surface to take tiling, with expanded steel, No. 10 mesh, 3-in. strands, 1¼-in. by $\frac{3}{16}$ in. embedded in same, including all centering and horsing ....per yd. super.	7	9
[Note.—Contractor's profit and attendance should be added. The price quoted is that paid to the special sub-contractor.]		
3-in. thick 6 to 1 cement concrete finished with levelled surface over boarded floors and include for well coating surface of same with boiled pitch and tar per yd. super.	1	10
3-in. thick 5 to 1 cement concrete finished with level floated surface to take tiling per yd. super.	1	
3-in. thick cement concrete 5 to 1 laid to falls, as directed, and finished to take granolithic, ...per yd. super.	1	4
1½-in. thick granolithic, laid in squares, between fillets ....per yd. super.	1	4
White deal rough in rafters, plates, ceilings, joists, &c. ....per ft. cube.	1	7
1¼-in. thick, tongued and grooved, white Norway flooring ....per square	20	0
1-in. thick white Norway flooring, but not tongued and grooved ....per square	15	0
2-in. thick red deal, framed, two panelled and beaded entrance doors ....per ft. super.	0	11
24-in. by 12-in. best quality Welsh Bangor slating, laid to 4-in. cover on 2½-in. by ¾-in. red deal sawn laths, thoroughly rendered in hair mortar ....per square	45	0
Milled lead and laying in gutters, aprons, flashings, &c. ....per cwt.	20	0
Dash, render, float and coat walls, finished white ....per yd. super.	1	0
Float and coat concrete partitions, finished white ....per yd. super.	0	8
Lath, render, float and coat ceilings, finished white ....per yd. super.	1	4
Woolliscroft's best quality 6-in. red and black tiles, laid square in cement...per yd.	3	9
[Note.—Contractor's profit and attendance should be added. The price quoted is that paid to the special sub-contractor.]		
Granite rubble masonry in cement mortar, each face weather pointed .... per yd. cube	18	0
⅝-in. red deal wrought one side R. and V. jointed sheeting in 4½-in. widths, nailed to underside of rafters ....per square	18	0

Competitors are warned that the council do not guarantee these rates, and the assessor will not in any way be bound by them when making his award. The con-



SCOTTISH NATIONAL EXHIBITION, EDINBURGH, 1908: DESIGN PLACED FIRST. JOHN A. CAMPBELL, I.A., F.R.I.B.A., ARCHITECT.

tracts out of which the foregoing prices have been copied were set during 1904, and the tendency since that date has been for prices to rise.

Shortlands Congregational Mission Hall.

The limited competition for the above new building has been decided in favour of Messrs. George Baines and Son, of 5, Clement's Inn, Strand, London, W.C.

Presbyterian Church, Roker, Sunderland.

Fifty-two sets of drawings were sent in for the proposed new Presbyterian Church in Side Cliff Road, Roker (16 sets from local architects). The assessor, Mr. William Wallace, of London, consulting architect to the Synod of the Presbyterian Church, made a selection of eight of the best designs, and finally awarded the first premium to Messrs. Cackett and Burns-Dick, of Newcastle, and the second premium to Messrs. W. and T. R. Milburn, of Sunderland.

Castleford Secondary School.

A meeting of the Governors on Friday night last discussed the position in reference to their decision to adopt the second premiated design in the recent competition for a school to cost £12,000. (The authors of the design placed first were Messrs. Percy Robinson and W. Alban Jones, and the author of the design placed second was Mr. W. S. Braithwaite, of Leeds.) The Chairman (Councillor Gill, J.P.) said they had intended to give the work to the architect whose plans were placed first, but the award was subject to the confirmation of the West Riding authorities: the latter accepted the award, but advised that the second-placed plan was the best. A letter from the Leeds and Yorkshire Architectural Society regretted that it should be proposed to ignore the design placed first by the assessor. They suggested that the matter should be re-considered. Mr. Percy Robinson suggested that the two designs should be referred to Mr. Felix Clay, architect to the Board of Education.—It was agreed to hold a special meeting to further consider the matter.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
June 15	PORCH FOR BORSTAL PARISH CHURCH, ROCHESTER.—Particulars from Hon. Secretary to Committee, Borstal Vicarage, Rochester.
June 15	ELEMENTARY SCHOOL AT HESWALL (for 300 Children).—Conditions from J. H. Grundy, clerk to Administrative Sub-Committee, District Council Offices, Hoylake.
June 24	REMODELLING OF SMITHFIELD, UTTOXETER (for cattle, sheep, pigs and calves).—Premium £20, for plan, specification and estimate. Particulars from F. S. Hawthorn, clerk, Council Offices, Uttoxeter.
July 1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5, Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth. Summary in "Builders' Journal," May 22nd.
July 1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown. Summary in "Builders' Journal," May 22nd.
July 2	CARNEGIE LIBRARY AT KILKENNY. —To cost £1,800. "Design, specification, and bill of quantities." Particulars from E. O'Connell, Town Clerk, City Hall, Kilkenny.
July 6	ZION INSTITUTIONAL CHURCH, MANCHESTER.—Limited to Manchester architects. Particulars from J. S. Gibson, 5, Old Bond Street, London, W.
July 20	SANATORIUM AT CORK (for 70 patients). Premium of £100. Particulars (price 10s.) from E. J. Murphy, secretary to Co. Cork Joint Hospital Board, Court House, Cork.
July 30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth. Summary in "Builders' Journal," May 22nd.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept. 2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept. 11	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN. — Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in "Builders' Journal," May 1st.

COMPETITION FOR SCOTTISH NATIONAL EXHIBITION, 1908.

The assessor, Mr. John James Burnet, A.R.S.A., F.R.I.B.A., of Glasgow, has recently issued his report on the twenty-six sets of designs submitted in the competition for the lay-out and buildings of this exhibition, which is to be held at Edinburgh. He awards the first premium of £100 to design No. 17, the second premium, also of £100, to design No. 9, and the third premium of £75 to design No. 14. The committee met in private to consider the assessor's report, and upon opening the sealed envelopes it was found the following received the awards:—1st Mr. John A. Campbell, F.R.I.B.A., of Glasgow; 2nd, Messrs. Walker and Ramsay, of Glasgow; 3rd Mr. T. Duncan Rhind, A.R.I.B.A., of Edinburgh. The committee resolved to award the premiums in terms of the assessor's report, but to accept the design placed second and to appoint that firm—Messrs. Walker and Ramsay—architects for the exhibition. This action they hold is within their power, and in terms of the conditions issued to competitors: one of the conditions bearing on this question is worded as follows:

> The designs will be submitted to Mr. J. J. Burnet, A.R.S.A., F.R.I.B.A., who will advise the committee in their selection, and unless some insuperable obstacle prevents (of which the Executive Council with the advice of its assessor shall be the sole judge), the author of the design he places first will be appointed architect for the said buildings.

It will be interesting to watch how the committee defends its action after such a clearly-worded paragraph. While both first and second designs are excellent, it is obvious that the second design is slightly less costly; but this can hardly be regarded as an "insuperable obstacle" if the author of the first premiated design can show that it could be erected for the stipulated sum of £20,000, plus 10 per cent. margin allowed.

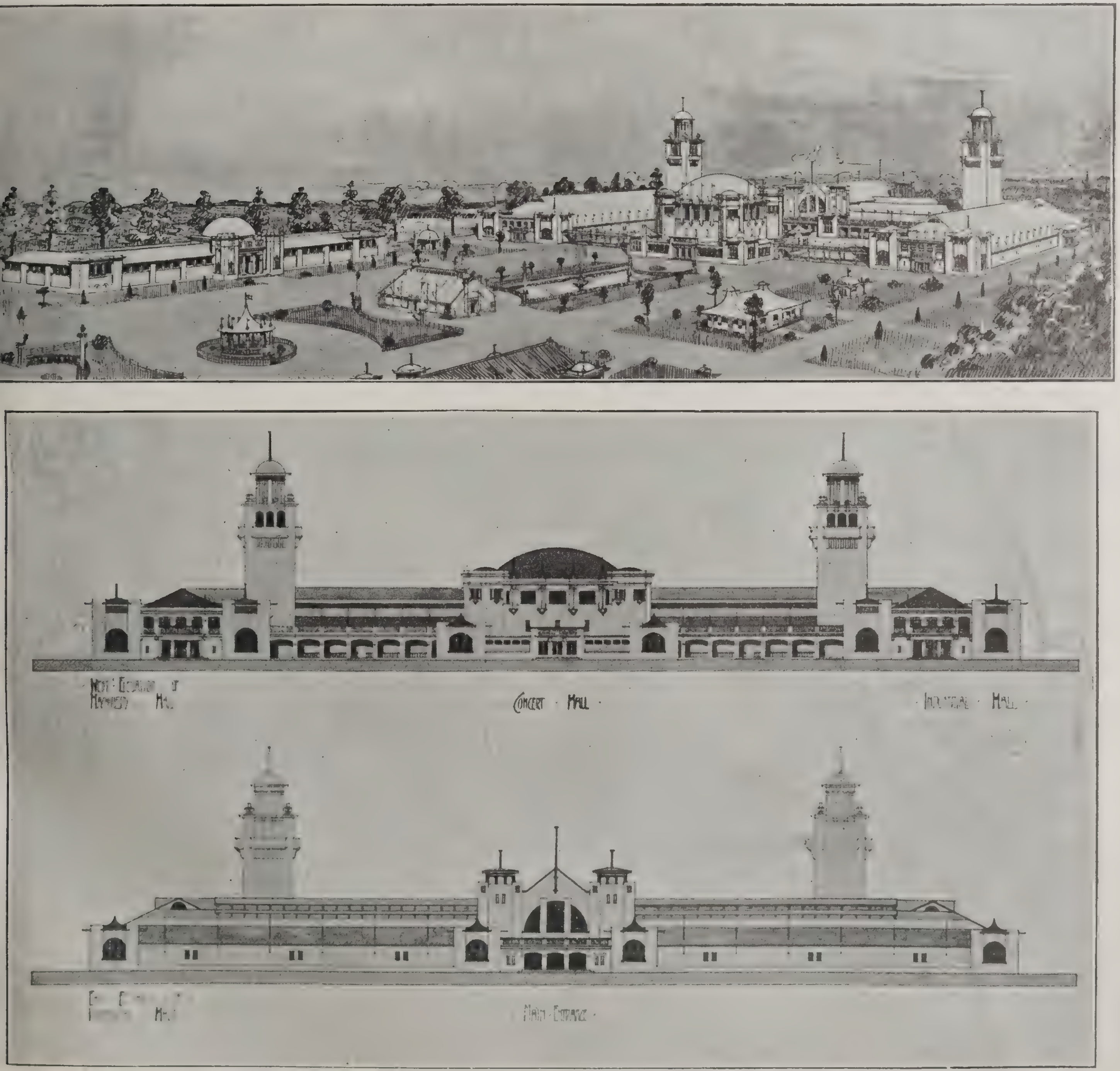
The designs have been on view at the Synod Hall, Edinburgh. The competition has been of a high order, both in design and draughtsmanship, many excellent wash drawings being submitted. In comparing the premiated designs with the others we are entirely in accord with the assessor's award, so far as the first and second designs are concerned, but we feel there are others more worthy of third place, both as regards design and cost, than that selected by him.

Design placed First.

The main buildings occupy the north-east corner of the site, with the Sports Ground to the west, and the existing grounds around old Saughton Hall to the south, these being left very much as at present, except for a wide roadway formed through them from the second entrance at the tram terminus. The Industrial Hall occupies a position to the extreme east of the group of buildings, and is set back a little from Balgreen Road, giving a wide carriage approach to the main entrance, which is a spacious circular-headed doorway flanked by lofty towers—an effective feature in the design—while on either side the elevation is broadly treated, terminating at the corners with square pavilions (rather too small in scale to harmonise with the dignified entrance). The entrance hall is lofty, and on either side are the avenues or aisles of the Industrial Hall proper, 100,000 sq. ft. in area. Towards the grounds, and connected by covered ways, is the Concert Hall to seat 2,000 persons, and beyond this is the "Central (open) Square," with main avenues, fairy fountain, etc. The Machinery Hall is a detached building placed on the north of this square, with the main service road at the back for taking in heavy machinery, &c. : the Fine Art Gallery with Winter Garden behind being to the south of the square and opposite the Machinery Hall, while the grand stand of the Sports Ground, with two lofty towers, forms a good finish to the square. The grounds are cleverly laid out with well-designed kiosks, refreshment rooms, &c.

Design placed Second.

The general arrangements of this design are somewhat similar to that placed first. The Industrial Hall is placed nearer to the public road, thus leaving more space for grounds, and it is planned with two wings at either side towards the back, one of which—that to the north and adjoining the service road—is the Machinery Hall : within the quadrangle, and in a central position, is the Concert Hall, circular in form and connected by covered ways at the ends of the wings. The flat dome of the Concert Hall, with minor domes to the staircase towers at the diagonals and the two lofty towers placed at the internal angles of the quadrangle, form a very effective group of buildings as viewed from the grounds, depending more on general form than detail for effect. The Art Gallery is to the north of the square, and is of simple and pleasing design, its principal feature being the entrance doorway topped with a dome over the entrance hall, which, in consequence, is a dignified and lofty apartment. The galleries, seven



SCOTTISH NATIONAL EXHIBITION, EDINBURGH, 1908: DESIGN PLACED SECOND (AND SELECTED).
WALKER AND RAMSAY, ARCHITECTS.

in number, are well arranged and top-lighted. In the lay-out of the grounds an intimate knowledge of this class of building is displayed, perhaps more than in any other design: for instance, two band-stands are provided, but are kept as far apart as possible, so that both could be used simultaneously without clashing with one another or the Concert Hall. Another good feature of the plan is the grouping of all the noisy amusements together in the extreme west portion of the site. All the main avenues or walks are planned in straight lines, giving direct access from one building to another, and from the main entrances.

Design placed Third.

This design has its main entrance at the extreme north-east corner of the site, with a lofty domed entrance hall, and the Industrial Hall arranged as wings to same, and at right angles to one another, forming a screen from the north and east winds to the central open court, in the centre of which is placed a band-stand. The Concert Hall and Art Gallery, being to the west and placed at an angle to the central open court, do not improve its general appearance, and it is very doubtful if they would successfully serve as wind guards. The dome is the principal feature of this design, and is over-elaborated, making the remainder suffer by contrast.

Other Designs.

The remaining designs included many excellent schemes, the most satisfactory being submitted by Mr. H. E. Clifford, F.R.I.B.A., and Messrs. Gardiner and Miller, of Glasgow; Mr. Hippolyte J. Blanc, R.S.A., F.R.I.B.A.; Messrs. P. L. Henderson and Robt. Sherar, and Messrs. W. Davidson and Bailey S. Murphy, of Edinburgh, and a design numbered 23, the author of which has not permitted his name to appear.

QUANTITY SURVEYORS' ASSOCIATION.

The annual general meeting of this association was held at the Holborn Restaurant on Friday, May 31st, the president, Mr. A. J. Gate, F.S.I., in the chair. The council's report on the past year was presented. This recorded a steady increase of membership and a satisfactory balance-sheet. In regard to the examinations held by the Association at King's College, the council noted with regret the comparatively elementary knowledge of "taking-off" and "pricing" which some of the candidates displayed. Intending candidates were reminded that in these two subjects, which are regarded as "typical," a very high percentage of marks is required. Attention was drawn to the fact that a register of assistants seeking employment (not necessarily members or students of the Association) had been opened, and had already proved of some considerable service; it was hoped that this register would be used as far as practicable by members who required assistance. Assistants desiring to be enrolled on this register must be recommended by a member of the Association.

Continuing, the report stated that the Committee on Professional Practice had devoted several meetings to the consideration of the Prevention of Corruption Act, 1906, and its effects upon the relations in some cases existing between the architect and the quantity surveyor. The committee had been in communication with the Council of the Royal Institute of British Architects, and had taken the opinion of an eminent K.C., and it was hoped shortly to issue a circular to members on this point.

The council had within the past year again been approached by the Transvaal Society of Quantity Surveyors with a view to affiliation. Under the Association's by-laws no provision existed for affiliation with any society, but the council expressed its willingness to call a general meeting of members, with a view to obtain the necessary powers, making the condition that the by-laws of any affiliated society should be subject to the council's approval, and that the by-laws providing for the admission of members should be more stringent. These conditions proving unacceptable to the Transvaal council, the matter had been allowed to drop. In view, however, of the number of applications for membership which the Association had received from South Africa, a small committee for South Africa had been appointed, with Mr. A. T. Babbs, of Cape Town, as hon. secretary.

The council noted with satisfaction that the scale of charges issued by the Association last year had met with some considerable acceptance, and was likely to prove of inestimable use to members in the future. The council noted also that under the Labourers (Ireland) Act, passed last year, the appointment of a surveyor in connection with any buildings erected under this Act was subject to the approval of the Irish Local Government Board.

In view of the probability of more stringent control being in the future exercised over the expenditure of local authorities than had been the case in the past, including those matters which immediately concern the quantity surveyor—*i.e.*, the cost of public buildings and the settlement of builders' accounts—the council considered the present opportunity a favourable one to approach the English Local Government Board on the subject. Some correspondence had taken place on the question of the employment of quantity surveyors on public buildings, and the council hoped that the result would be of benefit not only to the members of this Association, but to the profession generally.

The scrutineers reported that the following had been elected members of council for the ensuing year, in addition to Messrs. Lawrance and Gate, who were life members: *London members* — Messrs. T. J. Carless, H.T.A. Chidgey, S. Chatfeild Clarke, F.S.I., H. W. Crickmay, R. L. Curtis, jun., R. C. Gleed, F.S.I., W. R. Hood, F.S.I., and Henry Riley. *Provincial members*—Messrs. H. Curtis-Card, F.S.I., S. W. Doyle, A. Harris, F.S.I., and W. Hoffman Wood.

At a council meeting held subsequent to the annual general meeting at which the foregoing report was presented Mr. W. R. Hood, F.S.I., was elected president for the ensuing year, and Messrs. Arnold Harris, J.P., F.S.I. (Birmingham), and Mr. H. T. A. Chidgey (London) were elected vice-presidents.

Obituary.

Mr. William Evans, builder, of Swansea, died recently, aged 54.

Mr. Jonathan Andrews, builder, of 112, Mount Street, London, W., died on May 30th last, aged 73 years.

Notes and News

Mr. Francis Masey, F.R.I.B.A., has been elected president of the Cape Institute of Architects for the ensuing year.

The rebuilding of Crewe Railway Station, which has occupied twelve years and has cost nearly £1,000,000, has now been finally completed.

Mr. W. A. Osborne, who for the past 23 years has represented Mr. Jas. F. Ebner, has resigned, and is commencing business on his own account.

Bristol's new Hospital.—The Handel Cossham Memorial Hospital at Bristol has just been completed and opened. It is situated on the summit of Lodge Hill.

The new Wing to the Grosvenor Hotel, at Victoria Station, has now been completed and opened. It extends over the booking hall and other offices of the station. The new building contains 160 bedrooms, many of which have private bathrooms attached.

At Stoke Workhouse an administration block and a bakery block have been erected at a cost of £17,559. The dining hall is 96ft. by 46ft., and provides seating accommodation for 726 inmates. Mr. A. P. Miller, of Hanley, was the architect, and Mr. J. Bagnall, of Fenton, the builder.

London's newest Theatre is the Wardour Street Theatre, which may or may not be called the Piccadilly. Mr. W. G. R. Sprague is the architect of the building, which will be opened for August Bank Holiday. The proscenium opening is 30ft. wide, the depth of the stage is 40ft., and its width nearly 70ft., the height to the "grid" being 56ft.

Housing Exhibition at Letchworth (Garden City).—Three sites have been set apart for this exhibition: two for rural homesteads and small holdings, and one for urban cottages, ranging in cost from £175 to £250. There will probably be some fifty houses erected. The exhibition is to be opened in July. Cheap tickets from London at 2s. 6d. return are already issued, and will be available all through the exhibition period. Societies and organisations desirous of visiting Letchworth should communicate with the secretary, First Garden City, Ltd., 326a, High Holborn, London, W.C.

Two Monuments.—In St. John's Gardens, Liverpool, a monument to the late Canon Major Lester (whose life was chiefly associated with child-rescue work) was unveiled recently by Lord Derby. The monument takes the form of a bronze statue on a huge granite block: the statue was cast at Mr. A. B. Burton's foundry at Thames Ditton, and the pedestal was executed by Messrs. Kirkpatrick Bros., of Trafford Park, Manchester.—In St. Marylebone Cemetery, East Finchley, London, a monument has just been erected to the memory of the late Sir Peter Nicol Russell, Kt., engineer; he founded and endowed the Peter Nicol Russell School of Engineering at the University of Sydney, N.S.W. Mr. B. MacKennal is the sculptor of the work, a model of which is shown at this year's Royal Academy Exhibition. The pedestal is of selected Peterhead granite, polished. The execution and erection of this monument also has been carried out by Messrs. Kirkpatrick Brothers, and the bronze work by Mr. A. B. Burton.

Correspondence.

The Trade Catalogue.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—We have seen in your issue for June 5th the leader on the standardisation of catalogues. There is much to be said in favour of this, and your leader is certainly on correct lines. With regard to that portion of it dealing with standard sizes of covers with loose pages punctured for insertion, we may say that we have adopted this system for our engineering catalogues with much success. It enables us to add to, or deduct from, these lists at any time without going to the expense and trouble of having new lists prepared. We have also a system of binding for our foundry catalogues, a sample of which we send. As these lists are all of the one size they can readily be slipped into this binding, thus forming a complete catalogue, handy for reference and with our name prominently before our customers.—Yours truly,

CARRON COMPANY,
John Higgins.

Carron, Stirlingshire.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—We have read with considerable interest the leader on "The Trade Catalogue" in your issue for June 5th, and whilst agreeing in the main with what is there stated, we have our conviction that the adoption of the principle you have enunciated is impracticable, inasmuch as to a very great degree the size of the catalogue must be dominated by the number of pages the work contains. The ideal we set some time back has been adopted, we observe, by many of our friends in the trade. We then fixed for our own catalogues for use by the building trade a standard size of 12ins. by 10ins., a size which has proved most efficacious in practice. This view has been adopted by many competing houses, and, we may add, many of our other ideas as to arrangement and description of the goods illustrated.

As doubtless you have observed, the several salient points set forth in your leader have long since been anticipated by us, and put into operation: indeed, our trade catalogues embody all the suggestions made in your columns.

In our opinion it would be inconsistent to rigidly adhere to any definite size page, as some manufacturers are able to illustrate the whole of their productions upon, say, sixteen pages, and, for the ready comparison of designs of a similar character and value, prefer to show these at sight on two pages facing each other; this principle often necessitating the adoption of the landscape form, say, 12ins. deep by 20ins. wide. A catalogue of sixteen pages 12ins. by 10ins. can only be regarded as a pamphlet, and does not warrant the expenditure of binding in cloth or binding sufficiently stiff to constitute a catalogue. Hence it cannot take a place beside catalogues containing 400 pages or more. In these circumstances the thinner edition often is either lost sight of or becomes a mass of dog-eared leaves.

It is an absolute necessity to issue revised editions at reasonably close intervals. Taste, coupled with the enterprise of the designer and the manufacturer, is ever on the change; therefore the life of a catalogue is limited. The principle of adding new sheets is excellent in theory, but no good in practice. We claim that our experience in catalogue compilation is unique, and results have proved that our views are practical. We appreciate, however, your having brought the matter so prominently before those interested in the subject.—Yours truly,

YOUNG & MARTEN, LTD.
E. Montague Edwards,
Managing Director.

Stratford, London, E.

[No firm is more qualified to express an opinion upon this subject than Messrs. Young and Marten, whose catalogues have been greatly appreciated by the architectural profession and building trade for many years. We are very glad to receive their criticism upon our remarks, because it allows us to see the manufacturer's point of view more clearly, and gives us an opportunity to meet his objections, at the same time serving the interests of the catalogue user. We will deal seriatim with the points raised. Firstly, as to thickness. We had in mind a loose-backed cover which would allow of sufficient latitude. If, too, sectional catalogues were issued, the objection would have still less force. Secondly, as regards size of page. We admit the serviceability of Messrs. Young and Marten's standard, but the decision on such a subject would best be left to a committee of large manufacturers and users. We suggested that perhaps two or three sizes might be adopted, all capable of being bound in one cover. We fully recognise that certain firms issue excellent catalogues, but our chief objection was to their lack of uniformity. As regards the comparison of similar designs, it is not always necessary to have the reproductions of large size; they could be reduced so that two would go on a page. Fold-in sheets might also be used. Of course, there are exceptions to every rule, and nothing would prevent manufacturers departing from the standard if really necessary. Messrs. Young and Marten have a standard themselves, and therefore admit its usefulness. To the user the advantage would be still greater, and it is the user who should be studied first. As to smaller catalogues of pamphlet form, we do not suggest they should be issued in expensive covers. If, however, they conformed to a standard size, the user could bind several in one cover. We agree that the practice of adding new sheets is not satisfactory at present, but we feel sure this is due to the want of standardisation, which has led users to pay little attention to catalogues and their systematic collection and usage. —ED. B.J.]

To the Editor of THE BUILDERS' JOURNAL.

SIR,—We have read your leader on trade catalogues with much interest, and we feel that many of your remarks and suggestions are of considerable value. The objection, however, which we see to standardising trade catalogues lies in the enormous variety of goods to be catalogued. Such an arrangement would, we should think, be advantageous to firms handling a sufficient number of specialities to fill a book of 200 or 300 leaves, but when only one or two specialities are being offered, your arrangement would reduce the possibilities to a few loose sheets, which might or might not find their way into the prospective customers' miscellaneous volume.

We only offer one or two lines of goods, and we should hesitate to become parties to an arrangement which had the effect of reducing our announcements to a loose leaf or two. We look upon our trade list as an efficient salesman, and we think that an attractive list well illustrated is more likely to receive some attention than a loose leaf. We feel that if a party seeing the list is a buyer, he will keep either, but if only slightly interested in our class of goods he will keep an attractive pamphlet, whereas he would consign the loose sheets to the waste-paper basket.—Yours truly,

THE RUBEROID CO., LTD.
E. R. James.

London, E.C.

[In reply to the above, we can see no reason why a firm could not issue attractive catalogues of standard sizes containing as many pages as they wished, while the user might keep all or only a few of them, as he desired.—ED. B.J.]

Our Plate

House at Bovingdon, Herts.

This house, which is now in course of erection, is situated on a very pleasant site of several acres at Bovingdon, near King's Langley, Herts. The external walls are of hand-made sand-faced red bricks of varying tint, and the roof of similar tiles differing somewhat in colour. The window frames, which are painted white, have iron casements and are glazed with leaded lights. A special feature has been made of the loggia, or outdoor room, entered from the hall, drawing-room and dining-room. The principal garden front faces south-west and the entrance forecourt north-east, the latter protected by a belt of very fine hollies. A lodge and stable will probably be built in conjunction with the scheme. Mr. A. Timberlake, of King's Langley, is the builder, and Mr. Walter E. Hewitt, A.R.I.B.A., of 22, Buckingham Street, Strand, W.C., the architect.

Coming Events.

Thursday, June 13.
L.C.C. SCHOOL OF BUILDING, Brixton (Ferndale Road)—Prof. Beresford Pite, F.R.I.B.A., on "The Architecture of London": Lecture IV.—"Classical London—Somerset House, Waterloo Bridge, the National Gallery, Euston Station, &c.," at 7.30 p.m.

Thursday, June 13, to Monday, June 17,
SOCIETY OF ARCHITECTS.—Visit to Bath.

Saturday, June 15.
ARCHITECTURAL ASSOCIATION.—Fourth summer visit to new Town Hall, Bromley (Mr. R. Frank Atkinson, F.R.I.B.A., architect).

Monday, June 17.
L.C.C. SCHOOL OF BUILDING, Brixton (Ferndale Road).—Mr. Alan E. Munby, M.A., A.R.I.B.A., on "Building Methods in Nature's Workshop": Lecture III.—"The Structure of Stones," at 8 p.m.

Tuesday, June 18.
SURVEYORS' INSTITUTION.—Afternoon reception at Royal Botanic Society's Gardens, Regent's Park, from 4 to 7.

Thursday, June 20.
L.C.C. SCHOOL OF BUILDING, Brixton (Ferndale Road).—Prof. Beresford Pite, F.R.I.B.A., on "The Architecture of London": Lecture V.—"The Gothic Revival—Houses of Parliament, Law Courts, modern churches," at 7.30 p.m.

New Companies.

SALFORD STONE CO., 7, Regent Road, Salford. Capital: £1,000.

ENDERBY BRICK CO., Narborough, near Leicester. Capital: £2,500.

HUGHES & ROWLANDS, builders, hauliers, contractors, &c. Capital: £2,000.

E. BURNS & SON, builders, contractors, &c., Liverpool. Capital: £10,000.

NEW WIRE-WOVE ROOFING CO. (1907), Imperial Works, Fulham. Capital: £5,000.

CARLTON HILL BRICK CO., Eldon Chambers, Wheeler Gate, Nottingham. Capital: £5,000.

A. & J. WEBSTER, builders, joiners, &c., York Street, Peterhead, and Yarmouth. Capital: £30,000.

WIGAN AND DISTRICT BRICK SUPPLY CO., LTD., Wilds Chambers, King Street West, Wigan. Capital: £1,000.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional, or legal matters.

Correspondents are particularly requested to be as brief as possible.

Comparative Cost of Joinery.

London.—Oregon writes: "Kindly give a few figures showing the comparative cost—labour and material—of preparing a piece of joinery (say, a flight of stairs) in best yellow deal and Oregon pine."

Without a rough sketch or some more definite idea as to the actual piece of joinery you require, it is impossible to give a definite reply. As regards cost of labour, it would be about the same on Oregon pine as on deal, and the cost of material in Oregon somewhat cheaper than best-quality yellow deal. However, you would not be far from correct if you doubled the cost of your material, which would cover the cost of labour: say the deal or pine costs 3d. per ft., add 3d. per ft. for labour. "Plain work" Oregon pine is not suited for stairs.

Provision of Damp-Course.

X. writes: "I send plan and specification (not reproduced) of stables and coach-house converted into two cottages. There is no damp-course in existing walls, but we have put a damp-course of tar and sand to all the new parts built. Do you consider we are required to insert a damp-course in existing walls?"

The copy of the specification sent with this query does not appear to be complete, nor are the "conditions of contract" added. There is only one reference to a damp-course, and that appears to apply to the new work only. In the absence of any clause calling for the cutting away and under-pinning of the old walls, I am of opinion that no damp-courses in the old portion of the work are included in the contract.

F. S. I.

Curved Struts in Mediaeval Roofs.

London writes: "Why did the mediæval builders use curved wind braces, and sometimes struts, in their timber roofs, instead of straight ones? It appears to me that the curve given to these members would facilitate buckling under a load."

The struts and braces as used by the mediæval builders were usually curved for purely æsthetic reasons. It is true that curved struts are used in the hidden part of roofs, but it will usually be found that these timbers are sawn from curved boughs of trees. Of course, a curved strut such as you show in your sketch (not reproduced) would not resist buckling so well as a straight timber of the same section, but you must remember that in practically all framed timber structures the sectional areas of the timbers are very many more times larger than theoretically necessary to resist the tensile, compressive or bending stresses in them, on account of the amount of timber required to make the joints. This will be apparent if you calculate the stresses in any simple case of a framed timber roof, and make the timbers just the theoretical size necessary to resist the various stresses. It should also be noted that curved members sawn from a curved bough of a tree are comparatively very strong on account of the continuity of the fibres.

H. Y. M.

Buildings to Measure around Bristol.

Bristol.—"Do you consider St. Luke's Church, Brislington, a suitable subject for measured drawings for the R.I.B.A. Final, or is there a more suitable subject within five or six miles of Bristol? I do not wish to measure work in the town itself."

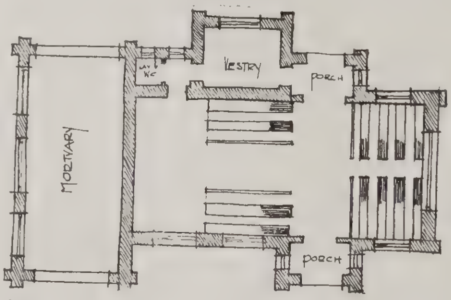
St. Luke's Church, Brislington, is a satisfactory subject to measure for the R.I.B.A. Final "Testimonies of Study." There are several other good churches in this district. The little church adjoining Hanhem Court is of the Early English period, with a late Norman font and curious Norman piscina. Bitton church has a fine nave, Perpendicular tower, stair turret, and some Norman portions. At Siston there is an Early English church consisting of a nave, chancel, square tower and south porch.

H. Y. M.

Cemetery Chapels.

Hull.—H. writes: "Kindly give some information respecting the design of a small cemetery chapel. Are there any special features in connection with the planning?"

A simple form of plan for a cemetery chapel is shown by the accompanying sketch, which needs no further explanation. The plan can of course be executed with or without the mortuary chapel.



T.

Book-Keeping for Architects.

Lancs.—J. H. C. writes: "I desire to know of a simple method of book-keeping suitable for my use as a practising architect. The double entry system appears to me to be of too complicated a nature, and takes up too much time to be of service. Will the single-entry system answer my purpose? I should be glad if you would recommend a good book on the subject."

The only work on the subject, so far as we know, is "Office Management: A Handbook for Architects and Civil Engineers," by W. Kaye Parry, price 10s. 6d., post free from our offices.

A Party Wall.

Kent writes: "A pulls down a cottage leaving wall with gable end exposed, and has cemented the upper portion, intending to advertise thereon. B, the adjoining owner, has given notice to desist, claiming the wall as his. Undoubtedly B's wall was built first about 20ft. high. Then, it appears, A's wall was built against it and carried up, overlapping B's 9ins., forming the gable end. Then B put on another storey to his, butting against same. The wall-plates and indents show that A has enjoyed the use of the wall. The building which A pulled down, and that of B now existing, were built over 50 years ago. Has A the right to use the face of wall? To whom does the wall belong?"

For building purposes it would appear that the wall in question is of party character, though possibly the lower 20ft. belongs absolutely to B. For purposes other than that of building, I am of opinion that the whole of the wall is B's property. The fact that it was partly built by another person does not affect the ownership, and if (as seems to be the case) the bricks were placed upon B.'s freehold, they are now his property, and he may restrain A from using the blank end for advertising purposes.

F. S. I.

Stone used for Wren's Buildings.

Tredegar.—P. writes: "Kindly state what stone the following buildings by Wren are built of:—Oxford Theatre; Trinity College Library, Cambridge; Campanile, Christ Church, Oxford; Ashmolean Palace at Winchester; Greenwich Hospital; St. Dionis, Blackheath; St. Edmund the King; St. Lawrence-Jewry; St. James's, Garlick Hill; St. Michael Royal; St. Margaret, Lothbury; St. Mary Somerset; St. Mary Aldermanbury; St. Nicholas Cole Abbey."

All Wren's London churches appear to be built of Portland or some very similar stone. The writer does not know of any record of the materials used in the churches mentioned in the above list. In the case of Wren's work at Greenwich there still exist the original copies of the contracts for the materials supplied and the work done. These are preserved in a portfolio in the R.I.B.A. Library, entitled "Contract Prices for Building Greenwich Hospital." The contract relating to the stonework is headed "A copy of contract between the Committee for ye fabrick and Thomas Hill and Edward Strong, masons, dated June ye 13th, 1696." Wren's work at Oxford also has the appearance of being executed in Portland stone, although the writer has no record of the fact.

H. Y. M.

Dry Rot in Dairy.

A. writes: "A small detached building is used as a dairy. There is no damp-course; floors are solid and tiled; walls are of brick, the inside covered with glazed tiles and the outside cemented. Dry-rot has extended to the roof, and sashes and door frames have gone. The glazed tiles are being thrown off, and the spores have gone right through the brick wall to the cement outside. What is the best way to treat it?"

Dry rot in connection with the dairy is decidedly unhealthy. As regards a treatment for it, one method that has been very efficacious is to apply a solution of mercuric chloride (about 1 ounce to 8 gallons water) to the wood and walls affected by the rot. Note: Mercuric chloride is very poisonous.) The inside of the wood, ground, walls, etc., must be carefully cleaned of all spores before applying the solution, and the work should be examined and treated where necessary during the subsequent twelve or eighteen months to thoroughly stamp out the disease. At the same time adequate ventilation is imperative.

THE TIMBER TRADE.

London Market in May.

There was little improvement in the wood trade in May; in fact, with the exception of some enquiry from the country and the Continent, the record of the month would be one of continued idleness. It is satisfactory, however, to find that there are faint indications in places of a revival in the demand, and this has kept prices firm for the best productions. Messrs. Churchill and Sim report there is no doubt, on the other hand, that there has been a good deal of selling, especially of battens, at somewhat lower prices, although this applies more to less well-known shipments than to the leading stocks. White Sea shippers have shown no disposition to force sales, being content to look on after selling a large proportion of their output early in the season. There is a little more anxiety on the part of St. Petersburg and Riga shippers to quit their stocks, even at some reduction in prices, and this must be directly attributed to the political unrest in Russia, to the fears of strikes, and to financial stringency. In London the deliveries are some 1,200 standards fewer than those of May, 1906, which is disappointing. Prices may be said to have been certainly no worse during the month, and in the absence of new supplies have even cheered up a little, especially for the smaller sizes. Prepared flooring seems to be unaffected by the high cost of new importations, and although prices moved up a little, they will have to go very much higher to encourage London buyers to operate. Freights continue to be obtainable at very low levels, and there is no difficulty in chartering for the limited quantities of wood goods contracted for to this market.

The abstract of dock stock, consumption, &c., for May, published by Messrs. Foy, Morgan & Co., is given in the table at the foot of this page.

Dock Stock.

The stock of wood in the public docks on May 31st was :—

	Pieces.
Foreign deals and ends - - -	1,216,000
Do. battens - - - -	2,206,000
Pine deals and battens - - -	495,000
Spruce do. do. - - -	724,000
Boards, rough - - - -	2,937,000
Do. prepared - - -	5,099,000

totalling 12,677,000 pieces, as against 10,039,000 in 1906, 12,412,000 in 1905, and 14,333,000 in 1904.

In other kinds the stock was as follows :—

Foreign wainscot logs - -	115 pieces.
Do. oak timber - -	1,630 loads.
Do. fir timber - -	1,387 do.
Do. Oregon pine, &c., spars and masts - -	2,767 do.
Colonial oak timber - -	611 do.
Colonial birch timber and planks	4,104 do.
Do. elm and ash timber -	694 do.
Do. yellow pine - -	623 do.
United States pitch-pine timber	11,839 do.
Do do. deals -	38,000 pieces
East India teak - - -	5,858 loads.

Deliveries.

The deliveries have been :—

	1st 5 m'ths. Pieces.	May. Pieces.
Foreign deals and ends -	1,493,000	293,000
Do. battens - -	2,251,000	450,000
Pine deals and battens -	359,000	100,000
Spruce do. do. -	563,000	120,000
Boards, rough - -	2,196,000	373,000
Do. prepared - -	5,438,000	1,252,000
Total - -	12,300,000	2,588,000

The deliveries direct from ship to craft were :—

	1st 5 m'ths. P.s.h.	May. P.s.h.
Deals and battens - -	19,251	7,759
Boards - - -	4,255	1,101
Total -	23,506	8,860

Soft Woods.

Swedish Deals, Battens and Boards.—The importation from Sweden has so far been on a very reduced scale, but really ample for the demand. London merchants have never been able to see a margin of profit on the season's free-on-board prices to warrant them in operating, and a small importation is the natural result. Prices were a little inclined to be stronger during the month, especially for the better class of battens; and floorings, though still selling at less than the cost of fresh importations, are inclined to strengthen, in the absence of the usual supply at this time of year. Free-on-board business has been in small compass, but a few Continental sales are recorded at full price where attractive specifications could be secured.

Norwegian Boards.—The smaller arrivals of prepared board have been welcomed by the market that has been kept rather short of them through the spring, and prices, especially for some few sizes, have slightly risen in consequence.

Russian Deals, Battens, and Boards.—Prices for last year's shipments of Archangel deals were stationary during the month, maintaining the slight improvement noticed during April. A considerable importation of Riga whitewood took place, and, in consequence of the low cost, buyers have been more attracted to this market than to any other. The White Sea shippers have not made great progress with their stocks for later shipment, and the quantity remaining for early delivery being inconsiderable, they have not pressed sales. The political situation in Russia generates a certain nervousness in buyers' minds as to the future course of the market, but it must not be assumed that large quantities will be available for later shipment, as present conditions point to a rather smaller supply than usual.

Finnish Battens.—A few battens have arrived and met with a fair sale. Prices for scantlings and the smaller sized battens slightly improved during the month, but there is no improvement in the prices of deals.

Prussian Timber.—The importation of fir timber was limited to one parcel. There is no free market except for balks, which are in fair demand, and the price of these has shown some slight appreciation. Oak has been more saleable, and several parcels changed hands during the month.

Canadian Timber.—There has been little market in London for pine deals, and prices, though very high, are more or less nominal, as the transactions are few and far between. Parcels of inferior quality are not wanted, and have consequently fetched prices which cannot compare with what is obtainable for first-rate shipments, and these conditions account for the wide difference in quotations. Spruce was freely imported during the month, and prices are kept at a low level by the competition of Riga whitewood. Birch planks are in better demand, and the supply of them not excessive. Hardwoods are rather better, and birch timber seems to be recovering its position a little. The demand for sawn timber during May was rather less than usual, but the market for Mobile and Pensacola wood keeps quite steady; prices for Darien wood are a little lower in consequence of fears of a heavy supply. The price of timber at the shipping ports is firmer again after the few cheap sales which have been effected, and there is certainly more enquiry in the country from buyers who had miscalculated the course of the market to some extent. Deals and prime boards have been in somewhat better demand in London, and the quality of recent shipments has been better and has inspired buyers with more confidence. Hewn timber has been difficult to come by, and what has come forward has met with a ready sale.

Hard Woods.

Teak.—Messrs. Denny, Mott & Dickson report that the landings in the docks in London during May consisted of 615 loads of logs and 274 loads of planks and scantlings, or a total of 889 loads, as against 2,154 loads for the corresponding month of last year. The deliveries into consumption were 678 loads of logs and 310 loads of planks and scantlings—together 988 loads, against 707 loads for May, 1906. The firmness of this market consistently accentuates, so far as Burmah and Siam teak are concerned. The sales both of logs and planks, although very moderate, exceed the imports. The unprecedentedly low stock of 3,671 loads of logs contains only some 2,000 loads of the Burmah and Siam descriptions, which gives little scope to consumers for a reasonable selection, either in respect to sizes or quality, and additional supplies to this market are badly needed. The position of Java wood continues to be perplexing to all concerned. The supply in stock is more than sufficient in quantity, but the run of sizes and quality is not tempting to consumers, and holders who need to realise this wood have to force it off at prices which must leave a heavy loss on the shipping cost, whilst making it very difficult to establish any consistency in selling rates on this side. Java teak, carefully shipped in

Abstract of Stock, Consumption, &c., in London Docks, for May.

All Docks.	Deals (Fir).	Battens (Fir).	Pine.	Spruce.	Pitch-pine Deals.	Deals and Battens in Aggregate.	Rough Boards (All Countries).	Flooring.	Floated Timber.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Loads.
1907. Public dock stock -	1,016,883	2,367,069	495,819	723,884	38,608	4,642,263	3,121,927	5,099,593	17,000
Monthly public dock consumption - - - -	264,903	529,557	107,965	126,634	8,420	1,037,479	389,329	1,293,738	3,084
Overside stock - - -	—	—	—	—	—	—	—	—	—
Overside consumption (estimated of dock):—									
110% per cent. Sawn 63 ,, Planed	291,393	582,513	118,761	139,290	—	1,131,964	428,262	815,055	—
Duration of supply at same rate of consumption - -	1·83 months.	2·13 months.	2·19 months.	2·72 months.	4·59 months.	2·14 months.	3·82 months.	2·42 months.	5·51 months.

respect to quality and acceptable specification, has won a sound position with consumers for a certain class of work where mild-natured teak is not essential; but ill-considered shipments have grown apace, leading to forced sales and general confusion, which seriously impedes the sound and steady outlet which it should be to the interest of the Java shippers to help to bring about.

Mahogany.—This market has been very firm, as although the consumption has been moderate, all descriptions of wood are so light in stock that a very considerable demand could not be met. The restriction in the London hardwood trade generally continues to develop, and calls for the serious consideration of both timber traders and the Dock Companies, the heavy charges of the latter having been conducive to driving trade from London to the outports.

R.I.B.A.

THE NEW COUNCIL.

A business meeting of the Royal Institute of British Architects was held on Monday evening at No. 9, Conduit Street, W., the chair being occupied by the president, Mr. T. E. Collcutt.

The election of the council, standing committees, &c., for the year of office 1907-8 was announced.

President: T. E. Collcutt.

Vice-Presidents: J. S. Gibson, Edwin T. Hall, Henry T. Hare, and Leonard Stokes.

Members of Council: Reginald Blomfield, J. J. Burnet, Alfred W. S. Cross, E. Guy Dawber, W. Flockhart, Ernest George, J. A. Gotch, E. A. Gruning, H. V. Lanchester, E. L. Lutyens, C. E. Mallows, Ernest Newton, W. A. Pite, A. N. Prentice, Halsey Ricardo, J. W. Simpson, John Slater, and Paul Waterhouse.

Associate Members of Council: H. A. Crouch, W. Curtis Green, Sydney K. Greenslade, and Stanley Hamp.

Representatives of Allied Societies: Hippolyte J. Blanc (Edinburgh), H. Dare Bryan (Bristol), H. S. Chorley (Leeds and Yorkshire), J. F. Groves (Cardiff, South Wales and Monmouthshire), Edmund Kirby (Liverpool), W. M. Mitchell (R.I. of Ireland), J. M. Munro (Glasgow), Paul Ogden (Manchester), and A. B. Plummer (Northern A.A.).

Representative of Architectural Association: Walter Cave.

Hon. Secretary: Alexander Graham.

New Fellows and Associates.

The following new members were then elected:—

Fellows.

O. D. Black (Liverpool).
A. Butler (Cradley Heath).
Sidney Caulfield (London, W.C.).
Philip B. Chatwin (Birmingham).
P. H. Currey (Derby).
F. B. Dunkerley (Manchester.
Nicholas Fitzsimons (Belfast).
D. Theodore Fyfe (London, W.C.).
Leslie W. Green (London, W.C.).
John Hartree (Hereford).
H. T. D. Hedley (Sunderland).
W. M. How (London W.C.).
P. Mainwaring Johnston (London. S.E.).
W. Scott-Deakin (Shrewsbury).
W. S. Skinner (Bristol).
William Stewart (London, E.C.).
Henry Tanner, Jun. (London, S.W.).
J. A. Thomas (London, S.W.)
Herbert Tooley (Buckhurst Hill).
R. Magill Young, B.A. (Belfast).

Associates.

T. C. Agutter (Shotley, near Ipswich).
S. C. Brittingham (Melbourne, Victoria, Australia).
Walter Hooker (London, E.C.).
K. G. Rea (Montreal, Canada).
S. J. Wearing (Leicester).

Polling.

Mr. Hebert W. Wills, A.R.I.B.A., then moved the following resolution:—"That a clause be inserted in the Revised By-laws empowering the taking of a poll on any professional question on the signed requisition of twenty-five members of the Institute."

Tenders.

Bedford.—For alterations and additions to "Swan" Hotel, Bedford, for Mr. H. Browning. Mr. T. Thurlow, architect, High Wycombe:—

J. Brignell, Cambridge	£4,900
C. Sims, London	4,500
F. G. Minter, Putney	4,381
J. Corby & Son, Bedford	4,381
S. Foster, Kempston	4,213
E. L. Ellis & Co., Balham	4,152
Redding & Son, Cambridge	4,100
W. H. Hinkins & Sons, Royston	4,042
Warton & Dunstall, Bedford	3,987
A. J. Dawes, Bedford	3,827
Banyard & Son, Cambridge	3,775
W. Howard, Huntingdon	3,700
Fitch & Cox, Enfield	3,699
W. Tout, Hendon	3,698
G. H. Gibson, High Wycombe	3,667
H. Martin, Northampton	3,586
C. H. Hunt & Son,* High Wycombe	3,571

* Accepted, to be completed in 19 weeks.

Canterbury.—For the restoration of Holy Cross Church, Canterbury. Messrs. Jennings & Gray, architects, 4, St. Margaret's Street, Canterbury:—

G. E. Wallis & Sons, Maidstone	£1,739
Whiting Brothers, Faversham	1,590
T. T. Denne, Walmer	1,580
W. Judges, Brighton	1,575
G. H. Denne & Son, Deal	1,568
C. Mount	1,500
Adcock & Son	1,444
A. J. Brewster	1,388
G. Browning*	1,346
A. S. Ingleton, Herne Bay	1,337

* Accepted.

Rest of Canterbury.

Chard.—For the erection of six cottages at Chard, for the Chard Industrial and Provident Society. Messrs. Symes & Madge, architects, Chard. Quantities by the architects:—

F. Munford, Crewkerne	£1,500	0	0
Spiller & Son, Taunton	1,420	0	0
A. Poole, Ilminster	1,397	0	0
Parsons Brothers, Chard	1,380	10	0
A. Fowler, Chard	1,369	0	0
J. H. Bishop & Son, Chard	1,350	10	6
R. Harris, Chard	1,350	0	0
Harris & Woolcott, Chard	1,305	0	0
C. Bryer, Bridgewater	1,300	0	0
F. Sidwick,* Chard	1,275	0	0
Gleed Brothers, Bridgewater	1,199	0	0

* Accepted.

Chard.—For the erection of a new wing to "Oaklands," Chard, for J. William Gifford, Esq. Messrs. Symes & Madge, architects, Chard. Quantities by the architects:—

Bird & Peppard, Yeovil	£1,575	0	0
T. Munford, Crewkerne	1,570	0	0
Spiller & Son, Taunton	1,388	0	0
Parsons Brothers & Dunster, Chard	1,385	10	0
A. Poole,* Ilminster	1,367	0	0
Harris & Woolcott, Chard	1,350	0	0

* Accepted.

Colne (Lancs.).—For the drainage, paving, flagging, &c., of (1) Cuerden Street; (2) Tatton Street; (3) Back Burnley Road (Cuerdon Street to Tatton Street), for the Corporation. Whole work:—

J. R. Atkinson, Colne	£1,675	10	7
J. Green & Sons, Burnley	1,632	3	0
Ward & Tetley,* Bradford	1,500	0	0

* Accepted.

Erith (Kent).—Alterations, additions and erection of stabling at 156, West Street, Erith, for Mr. Henry E. Tate. Mr. Harry A. Roberts, architect and surveyor, 18, Vickers Road, Erith:—

S. Wiles & Sons	£850
Friday & Ling	640
J. F. Turner*	489
A. F. McLean	475

* Accepted.

Great Yarmouth.—For the completion of the St. James's Church, Great Yarmouth. Messrs. Olley & Haward, architects, Queen Street, Great Yarmouth:—

J. E. Pestell	£3,346	0	0
Bowman & Sons, Stamford	3,320	0	0
Hawes & Son, Norwich	3,275	0	0
J. D. Harman	3,211	19	0
C. Wiseman	3,198	0	0
Bell & Sons, Cambridge	3,166	0	0
Moore & Sons	3,100	0	0
Redding & Sons, Cambridge	3,100	0	0
R. Eastoe	3,030	0	0
W. Porter, Cromer	2,991	3	4
L. G. Hadingham	2,975	10	0
B. G. Beech	2,975	0	0
G. W. Beech	2,966	10	0
Carter & Wright	2,950	0	0
Spencer, Lants & Co.,* Felixstowe	2,865	0	0

* Accepted.

Rest of Great Yarmouth.

Hereford.—Accepted for the erection of a pair of semi-detached villas on the Belmont Estate, for Mr. Charles Russell. Mr. Herbert Skyrme, architect, Hereford:—

Wm. Powell, Hereford	£650

London, S.E.—For the partial reconstruction of the Sparta Street and Plough Bridges, in connection with the electrification of the tramways from Greenwich to Lewisham, for the London County Council:—

Alfred Thorne & Sons, London	£4,151	3	0
J. A. Ewart, London	4,074	15	9
Pedrette & Co., London	3,867	12	9
Anthony Fasey & Son, Leytonstone	3,777	11	8
Greig & Matthews, London	3,720	18	3
S. Pearson & Son, Ltd., London	3,670	0	0
J. Moran & Son, Ltd., London	3,600	0	0
The Motherwell Bridge Co., Ltd., Motherwell	3,446	9	5
Dick, Kerr & Co., Ltd., London	3,439	17	3
Francis Morton & Co., Ltd., London	£3,378	9	10
George Hay & Co., London	3,375	2	3
Charles Wall, Ltd., London	3,306	12	7
W. Muirhead & Co., London	3,193	5	0
Rowlingsons & Co.,* London	2,941	5	9

Chief engineer's estimate, £3,349 14s. 3d.

* Accepted. Steelwork sub-let to Redpath, Brown & Co., Ltd.; asphalt sub-let to the French Asphalte Co.

London, S.E.—For the erection of the smaller hall and club rooms, being the first portion of the "Dartmouth Hall" scheme, Perry Vale, Forest Hill, S.E. Mr. Victor Wilkins, architect, 24, Finsbury Square, E.C.:—

Pratt & Sons, Sydenham	£3,070	7	9
S. Blow, Tower Hill, E.C.	2,821	0	0
T. H. Roberts & Co., Forest Hill	2,623	0	0
Groom & Richardson, Finsbury, E.C.	2,493	0	0
A. Black & Son, Forest Hill	2,400	0	0
J. & C. Bowyer, Upper Norwood	2,397	0	0
Sabey & Sons, Islington, N.	2,366	0	0
E. C. Christmas, Forest Hill	2,347	0	0
Ford & Walton, Kilburn, N.W.	2,299	0	0
W. H. Sharpe, Barnet	2,280	0	0
W. Lawrence & Son, Waltham Cross	2,274	0	0
C. Brightman, Watford	2,193	0	0
E. J. Saunders,* Croydon	2,150	0	0

* Accepted subject to amendment.

London, S.W.—For the erection of a public elementary school for 1,116 children (352 boys, 352 girls, and 412 infants), on land adjoining the "Southfield" school, Wandsworth, for the London County Council. Mr. T. J. Bailey, architect (Education):—

B. E. Nightingale, Albert Embankment	£20,440	0	0
J. Guttridge, Peterborough	19,804	0	0
W. E. Davey, Southend-on-Sea	19,372	2	4
Martin Wells & Co., Ltd., Vauxhall	19,060	0	0
H. Y. Flint, High Wycombe	19,005	8	2
T. H. Kingerler & Sons, Oxford	18,992	0	0
W. Johnson & Co., Ltd., Wandsworth Common	18,971	0	0
Galbraith Brothers, Camberwell Green Works	18,887	12	8
J. & M. Patrick, Wandsworth	18,862	0	0
Unsigned, 190-192, Waterloo Road	18,643	0	0
Lole & Co., Chelsea	18,595	3	10
G. E. Wallis & Sons, Ltd., Maidstone	18,566	0	0
C. Wall, Ltd., 4, Lloyd's Avenue	18,500	0	0
Unsigned, Sparrow Hill, Loughborough, Leicester	18,481	18	8
W. Moss & Sons, Ltd., Loughborough	18,392	15	7
J. & C. Bowyer, Upper Norwood	18,185	0	0
W. E. Blake, Plymouth	17,831	15	5
Holliday & Greenwood, Ltd., Brixton	17,777	0	0
E. J. Clayton,* Aldine Works, Shepherd's Bush	17,129	0	0
F. & E. Davey, Ltd., Southend-on-Sea	17,124	1	8

* Recommended for acceptance. Architect's estimate, £18,063.

"It will be seen that the difference between the amounts of the lowest and second lowest tenders is comparatively small, and in view of the slackness of work in the London building trade at the present time, and the fact that the firm submitting the second lowest tender is a London one, and the whole of the work will be executed within the 20 mile radius, we are of opinion that the tender of this firm should be accepted."

London, W.C.—For providing and fixing a steam heating installation on the vacuum system, and calorifiers for hot-water supply, at the new Central School of Arts and Crafts and London Day Training College, Holborn, for the London County Council:—

J. & F. May, Lincoln's Inn Fields	£5,650
J. Richmond & Co., Ltd., Hatton Garden	5,645
Moorwood, Sons & Co., Ltd., 30, Gray's Inn Road	5,360
J. Simpson & Co., Ltd., Grosvenor Rd.	4,925
Brightside Foundry and Engineering Co., Ltd., Sheffield	4,742
Ashwell & Nesbit, Ltd., Bedford Row	4,730
G. & E. Bradley,* 68 and 70, Elfort Road, Highbury	4,589

* Recommended for acceptance.

Chief engineer's estimate, £4,750.

Oldbury.—For taking up and reconstructing about 503 lin. yds. of 18-in., 12-in., and 9-in. pipe sewers, including cast-iron pipes under canal, together with reconstruction of manholes, also laying about 800yds. of 12-in. pipe sewers, with new manholes, and other works, for the U.D.C. Mr. John T. Eyres, M.I.C.E., engineer, Clarence Chambers, 39, Corporation Street, Birmingham:—

Sutherland & Thorpe, Harborne	£2,965	3	6
E. Boore, Smethwick	1,988	13	2
J. Riley, Cheltenham	1,931	4	0
T. H. Macdonald, Oxford	1,527	17	9
H. B. Neal, Ltd., Plymouth	1,450	0	0
Johnson & Langley, Leicester	1,368	11	6
T. H. Harper,* Carlton	1,235	18	10

* Accepted.

Tipton.—For furnishing Carnegie branch library, for the Tipton U.D. Council. Mr. George H. Wenyon, M.S.A., architect:—

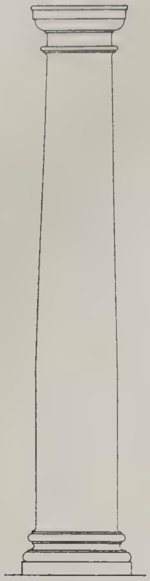
Midland Educational Co., Birmingham	£69	10	6
Phillips & Jones, Wolverhampton	66	9	0
S. Hill, Dudley	55	7	6
E. Brain & Sons,* Tipton	50	7	0
R. Speakes & Sons, Wolverhampton	Withdrawn.		

* Accepted.

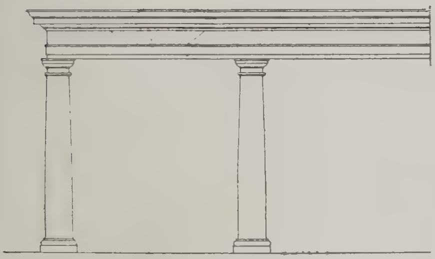
ARCHITECTURAL DIS-ORDERS COMPETITION.

(Nineteenth Series.)

CLASS A (ARCHITECTURE).



A 51



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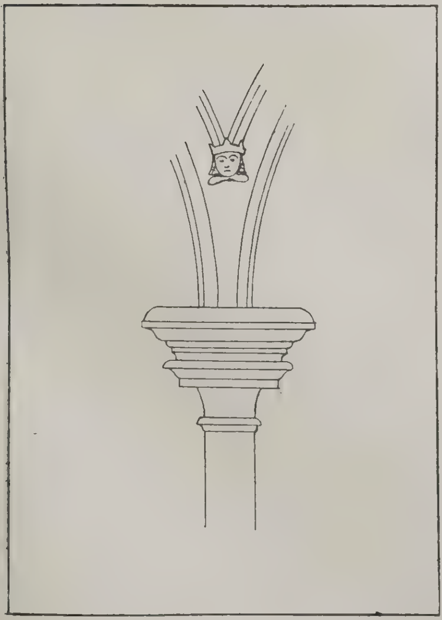


A 53

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Price.—£10

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

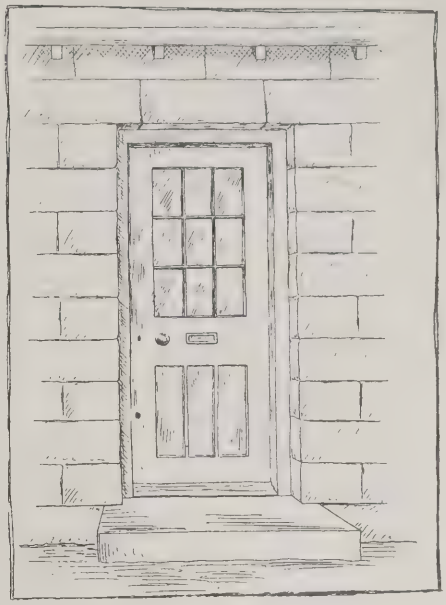
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any volation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

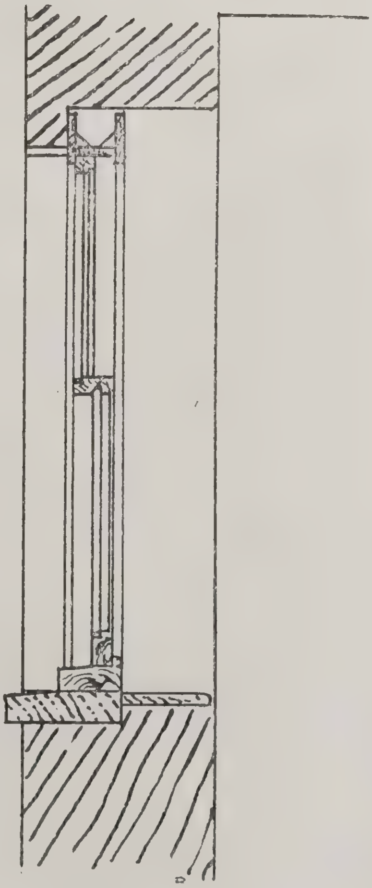
(*For Coupons see page xvii.*)

Copies of "THE BUILDERS' JOURNAL" *containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.*

CLASS B (BUILDING).



B 54



B 55

Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

June 14. Hirwain.—*Enlargement of Hirwain Parish Church.* Plans can be seen on application to the Rev. J. Morgan, the Vicarage, Hirwain, and at the offices of G. E. Halliday, F.R.I.B.A., diocesan surveyor, 19, Castle Street, Cardiff, where bills of quantities can be obtained. Sealed tenders are to be delivered to G. E. Halliday, on or before June 14.

June 14. Norfolk.—*Proposed enlargement* and other alterations at Alpington and Yelverton School. Builders desirous of tendering should send in their names at once to Morgan & Buckingham, architects, 1, Upper King Street, Norwich, from whom bills of quantities can be obtained on and after June 7, and at whose offices plans and specification can be inspected. Builders desirous of tendering for the proposed enlargement and other alterations at Bodham and Kelling Schools should send in their names at once to E. J. Tench, architect, Royal Insurance Buildings, Upper King Street, Norwich, from whom bills of quantities can be obtained on and after June 7, and at whose office plans and specifications can be inspected. A deposit of £1 1s. will be required in each case. Tenders must be delivered by 12 noon on June 14, addressed to "The Secretary, Norfolk Education Committee, 57, London Street, Norwich," and endorsed "Tender for Alpington, Bodham, or Kelling School." The builders whose tenders are accepted will be required to enter into bonds for the due execution and performance of the work. It is intended that the greater part of the work shall be carried out during the Harvest holidays.

June 14. Settle.—*Taking down and rebuilding* retaining wall at Mill Bridge, Longpreston, also for work in improving corner at Town End, Wigglesworth, for the Settle R.D.C. Further particulars can be obtained from W. A. Stuart, highway surveyor, Town Hall, Settle, on or before June 14.

June 17. Whitehaven.—*Erection and completion of a new mixed secondary school* at Whitehaven, in accordance with plans and specifications prepared by Grayson & Auld, architects, 31, James Street, Liverpool. Copies of bills of quantities can be obtained upon application at the Architects' office, and will be sent on payment of £2 2s. Plans and specifications can be seen at the same address, as well as at the Town Hall, Whitehaven. No part of the work may be sublet without the consent in writing of the architects. Sealed tenders, endorsed "Whitehaven School," must be received by C. C. Hodgson, secretary, The Courts, Carlisle, not later than 11 a.m. on June 17.

June 17. Ebbw Vale.—*Execution of jobbing work* at the schools for the ensuing twelve months, for the Ebbw Vale Education Committee. Forms of tender may be obtained from H. Waters, Committee's architect, Waungoch, Beaufort, or at Market Chambers, Ebbw Vale, on payment of a deposit of 10s. 6d. Tenders, enclosed in a sealed envelope (endorsed on the outside "Tenders for Jobbing"), should be delivered at the office of T. Hughes, secretary, on or before June 17.

June 18. Bourne.—*Erection of additional classrooms* and a new system of heating at Star Lane Council Schools in Bourne. Persons desirous of tendering are requested to send their name and address to W. B. Purser, County Surveyor's Office, Grantham, where plans and specifications may be seen, and from whom bills of quantities may be obtained on payment of a deposit of £1 (cheque preferred). Tenders, endorsed "Tender for Bourne Star Lane School," to be delivered on or before June 18 to H. Donaldson, secretary, County Education Office, 64, London Road, Grantham.

June 18. London, N.W.—*Erection of buildings* at their King's Road power station, for the B.C. of St. Pancras. Copies of specification, conditions of contract, quantities, and form of tender to be obtained upon application at the Electricity Department Offices, 57, Pratt Street, N.W., on payment of £2. Tenders to be sent to C. H. F. Barrett, town clerk, Town Hall, Pancras Road, London, N.W., endorsed "Tender for Buildings," by 12 noon on June 18.

June 18.—Scarborough.—*Erection of excursion station buildings* at Scarborough, for the North-Eastern Railway. Plans and specification may be seen and quantities and further information obtained upon application to W. Bell, the Company's architect, at York. Duplicate plans may also be seen upon application to the Stationmaster at Scarborough. Quantities supplied on personal application to parties tendering for the whole of the works. Sealed tenders, marked "Excursion Station, Scarborough," to be sent to R. F. Dunnell, secretary, at York, not later than 9 a.m. on June 18.

June 18. Bradford.—*Erection of branch stores* and 13 through houses at Smiddles Lane, Little Horton, Bradford, for the Great Horton Industrial Society, Ltd. Drawings may be seen, and quantities obtained, at the office of J. Drake & Son, architects, Queensbury, from June 11 to June 18, on which last-named day sealed tenders must be sent to the Secretary, at the Central Stores, Great Horton, not later than 5 p.m. Fair wages clause.

June 19. Holbeck.—*Alterations and additions* to be carried out at the dwelling-house, situate at the Manor Road Depôt, Holbeck, for the Waterworks Committee of the Leeds City Council. The plan and conditions of contract may be inspected, and specification with quantities may be obtained at the Waterworks Engineer's Office, Municipal Buildings, Leeds. It must be specially noted that the work must be completed within two months. Sealed tenders, endorsed "Alterations to House, Manor Road Depôt," must be delivered and addressed to "The Chairman of the Waterworks Committee, Town Hall, Leeds," not later than 10 a.m. on June 19.

June 19. Porth.—*Erection of ten houses* at Porth, for Mrs. Packer, Alder Grove, Porth. Plans and specification may be seen at the office of J. T. Jenkins, architect, Porth. Sealed and endorsed tenders to be delivered to him before noon on June 19.

June 19. London.—*Alterations at the Workhouse* and Infirmary in Harrow Road, W., for the Guardians of the Poor of the Parish of Paddington, pursuant to plans and specification to be seen at the offices of F. J. Smith, F.R.I.B.A., architect, Parliament Mansions, Victoria Street, S.W., between 10 a.m. and 5 p.m., where all necessary information can be obtained, as also form of tender, upon which alone proposals will be received. Bills of quantities may also be obtained at the offices of the said architect on payment of a deposit of £5 5s. Fair wages clause. Sealed tenders must be delivered at the offices of the said Guardians, 313-319, Harrow Road, W., before 10 on June 19.

June 19. Strood.—*Alterations to the girls' and infants' departments* of the Strood Church of England school. Plans and specifications can be seen at the office of A. Kennette, correspondent, Guildhall, Rochester, and bills of quantities can be obtained on deposit of 10s. 6d. Sealed tenders, endorsed "Tender for Alterations to Girls' and Infants' Departments, Strood Church of England School," are to be delivered at the Correspondent's office by noon on June 19.

June 19. St. Helens.—*Erection of new schools* in College Street, St. Helens. On deposit of the sum of £1 1s. plans and specifications may be inspected, and bills of quantities and conditions obtained, at the office of F. S. Biram, architect, Hardshaw Street, St. Helens. Sealed tenders, endorsed "Tenders for New Schools, College Street," must be delivered to W. H. Andrew, town clerk, Town Hall, St. Helens, not later than 10 a.m. on June 19.

June 20. London, W.—*Reinstating ceilings, &c.*, at their Infirmary, Fulham Palace Road, W., for the Guardians of the Poor of the Parish of Fulham. Persons desiring to tender may obtain a specification and form of tender on any day from June 10 to 13, inclusive, upon application to E. J. Mott, clerk to the Guardians, Guardians' Offices, 129, Fulham Palace Road, Hammersmith, W., with a deposit of £1. Tenders must be signed, sealed and delivered to the Clerk to the Guardians, as above, not later than 10 a.m. on June 20.

June 20. Dorset.—*Repairs at the following Council Schools,* the work to be carried out during the summer holidays:—Almer, Gillingham, Lytchett Minster, Morden, Portland Eastern, Stour Provost, Wareham, West Chickerell. Tenders endorsed "Council School Tender" to be sent in on or before June 20 to the Secretary to the Education Committee, Dorchester, on special forms provided. Specification, &c., may be seen, and forms of tender obtained, at the various schools.

June 21. Bangor.—*Erection of a new chapel,* lecture hall, classrooms, &c., at Park Hill, Bangor, for the Calvinistic Methodists. Plans to be seen at the office of R. Davies & Son, architects, Bangor, from 9 a.m. to 5.30 p.m. Sealed tenders, endorsed "Park Hill Chapel," to be sent to the Architects by noon on June 21.

June 22. Haslemere.—*Alterations and additions* to the Fernhurst Camelsdale Council School, near Haslemere. Plans, specifications, and conditions of contract may be seen at the School, and bills of quantities obtained on application to L. Thompson, secretary to the West Sussex and Chichester Joint Education Committee, Horsham, on payment of a deposit of £1 1s. The contractor whose tender is accepted will be required to enter into a contract with the West Sussex County Council, and if required, to enter into a bond with two approved sureties for the due carrying out of the contract. Tenders, endorsed "Tender for Alterations and Additions to the Fernhurst Camelsdale Council School," to be addressed, sealed, and delivered to the Secretary not later than June 22.

June 22. Llanrhaiadr.—*Erection of a cottage* near Tyngraig, Llanrhaiadr, one mile from Pentrefelin Station, for Lady Williams Wynn, containing kitchen, back kitchen, pantry, with three rooms upstairs, and usual outbuildings. Stones found for main walls. No tender necessarily accepted. Further particulars from Llangedwyn Estate Office. Tenders must be received on or before June 22.

June 24. Lowestoft.—Contract No. 5.—*Erection of a retort-house* and coalyard wall, for the Directors of the Lowestoft Gas and Water Co. Specification and drawings may be inspected and schedule of quantities and form of tender obtained on payment of £2 2s. at the office of the Company, London Road, Lowestoft, and at the office of F. and C. Hawksley, civil engineers, 30, Great George Street, Westminster. Tenders must be delivered at the office of C. E. Allerton, secretary, Gas Office, 137, London Road, Lowestoft, on or before 10 a.m. on June 24.

No date. Clonard.—*Erection and completion* of the new Church of the Most Holy Redeemer, Clonard, Belfast, for the Very Rev. P. Murray, C.SS.R., Provincial. Bills of quantities have been prepared by A. Ferguson, building surveyor, Scottish Provident Buildings, Belfast, and may be obtained from him on the deposit of £3 3s. Inspection of plans and specification can be made and all particulars obtained at the offices of J. J. M'Donnell, architect, 27, Chichester Street, Belfast.

No date. Freshfield.—*Erection of a convalescent home*, Freshfield, Lancashire. Drawings and specification may be inspected at the Estates Office, Birkdale, and a copy of the quantities obtained upon payment of £2 2s. Sealed tenders to be addressed to C. J. Weld-Blundell, Blundell House, Campden Hill, Kensington, London, W.

ENGINEERING.

June 14. Walthamstow.—*Supply and delivery of the following cables:*—260yds. triple concentric cable, and 100yds. of three-core cable. Specifications and forms of tender may be obtained on application to G. R. Spurr, electrical and tramways engineer, Priory Avenue, Walthamstow. Sealed tenders, endorsed "Tender for Cables," to be delivered by post only to C. S. Watson, clerk, Town Hall, Walthamstow, not later than 12 noon on June 14. Fair wages clause.

June 17. Coventry.—*Supply and erection* at their Foleshill Works of cast-iron pipe condensers, together with valves and connections complete, for the Gas Committee of the Coventry Corporation. Weight of condensers will be approximately 260 tons cast-iron and 8 tons wrought-iron and mild steel. Form of tender with schedule of quantities, specification, general conditions and prints of drawings will be supplied on application and on payment of £1 1s., which will *not* be returned. Tenders must be addressed to the Chairman of the Gas Committee, Gas Works, Coventry, and delivered sealed not later than first post on June 17.

June 17. Bacup.—*Laying, &c., of water-mains* in connection with the new reservoirs, for the Bacup Corporation. The works comprise laying 15-in., 12-in., 10-in., 8-in., 7-in., and 6-in. pipes, together with the necessary valves, hydrants, and other appurtenances. Drawings and specification may be seen and quantities, form of tender, and all other particulars obtained on application at the offices of J. Diggle & Son, civil engineers, Hind Hill Street, Heywood, and 14, Victoria Street, Westminster, S.W., on payment of a sum of £2. Sealed tenders, endorsed "Tender for Pipe Lines," to be sent in to J. Entwistle, town clerk, Town Hall, Bacup, not later than June 17.

June 17. Oulton.—*Supply of a self-registering weighbridge* for their workhouse at Oulton, near Lowestoft, for the Guardians of the Mutford and Lothingland Union. Separate tenders should be sent in for 5 and 7-ton machines, and two prices given—one to include fixing complete and the other excluding the necessary brickwork, foundations, and fixing. The successful contractor must supply working plans. Tenders, marked "Tender for Weighbridge," must reach F. Peskett, clerk, 148, London Road, Lowestoft, on or before June 17.

June 22. Buckingham.—*Sinking and lining of a borehole* and the erection of pumping plant, &c., in connection with the water supply of Buckingham, for the U.D.C. Full particulars, specifications and forms of tender may be obtained on application to J. Smith, engineer and surveyor to the Council, on deposit of £2 2s. Sealed tenders on the form supplied, endorsed "Waterworks, Maids Moreton," to be delivered at the office of T. R. Hearn, clerk to the Council, West Street, Buckingham, on or before June 22.

June 24. Aberdeen.—*Supply, delivery and fitting up* complete of manganese steel points and crossings, and special track work required for dock railway layouts, for the Aberdeen Harbour Commissioners. Copies of the specification, schedule of quantities, and the contract drawings may be obtained from R. G. Nicol, engineer, Harbour Engineer's Office, Aberdeen, on payment of £2 2s. Tenders, endorsed "Tender for Special Track Work," are to be lodged with the Engineer not later than 12 noon on June 24.

June 24. London, E.C.—*Supplying and fixing an electric light installation* on the stage of the Central Club Society, Ltd., Clerkenwell Road, E.C. Copies of specification can be obtained from G. Cunningham, secretary, at the Society's Office, on payment of a fee of 2s. 6d. Tenders to be delivered by June 24, at 10 a.m.

June 24. Portsmouth (Contract No. 22).—*Supply, delivery and erection* of one 1,000-kw. turbo-alternator, with condensing plant and accessories. Specification and form of tender can be obtained at the Town Hall, Portsmouth, on payment of a fee of £3 3s. A copy of the specification may also be inspected (but not obtained) at the offices of Kincaid, Waller, Manville & Dawson, consulting engineers, 29, Great George Street, Westminster, S.W. Tenders must be for the whole of the above work, and no tender for a portion only will be considered. Fair wages clause. Sealed tenders, endorsed "Tender for Contract No. 22," must be forwarded to A. Hallard, town clerk, Town Hall, Portsmouth, on or before noon on June 24.

(*Contracts continued on page xiv.*)

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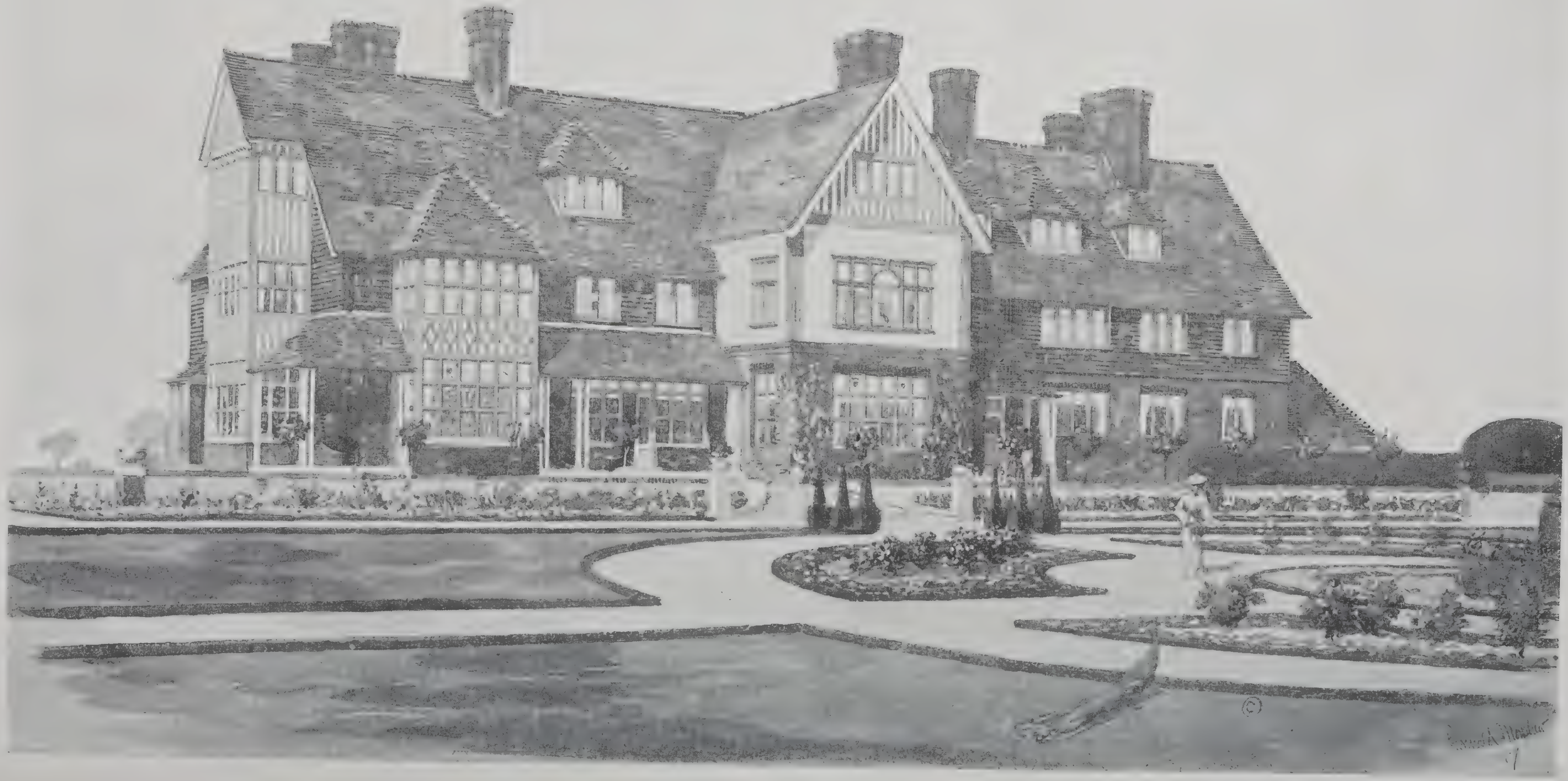
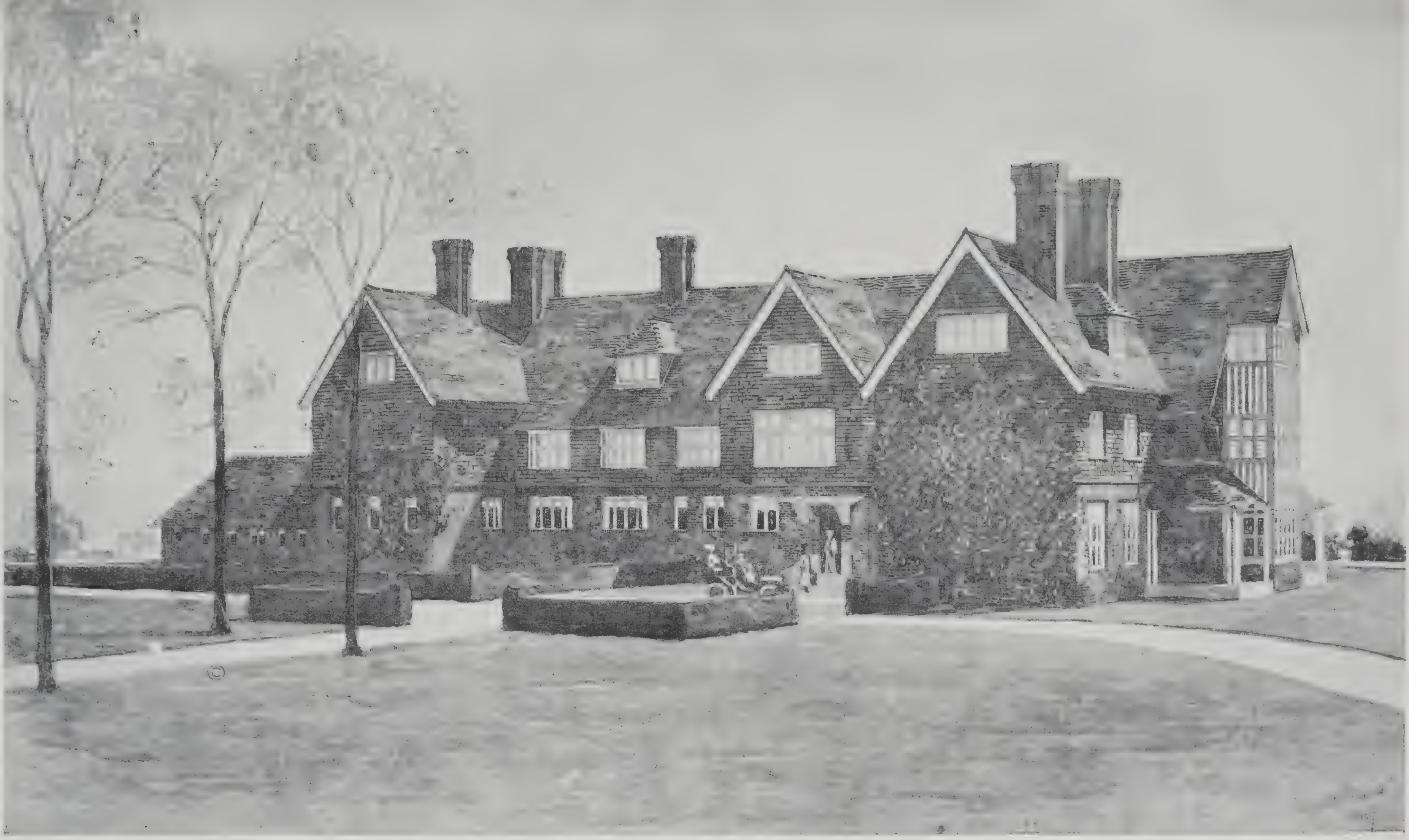
Supplement to
THE BUILDERS' JOURNAL AND ARCHITECTURAL ENGINEER,
Wednesday, June 19th. 1907.



Garden Front.



Entrance Front

"EYEHURST," CHIPSTEAD, SURREY. REGINALD MORPHEW, ARCHITECT.

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June 19, 1907. Volume 25, No. 645

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

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The **Concrete and Steel Supplement** is given in this issue.

The Subscription Rates per annum are as follows:—

At all newsagents' and bookstalls - - 8s. 8d.
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All Accounts are payable to Technical Journals (1902), Ltd. Cheques should be crossed "London and Westminster Bank, Temple Bar Branch." Post Office. Orders should be made payable at Fleet Street, E.C.

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The Smoke Question. The Public Control Committee has submitted an important report to the London County Council on the subject of the smoke nuisance in London. Briefly, the Committee complains of the cumbersome procedure needed to secure convictions against firms allowing smoke to be emitted from their factory chimneys, and also that the existing Acts are not sufficiently comprehensive, applying only to the emission of black smoke. The Committee asks the Council to apply for more adequate powers—namely, to cover any serious emission of smoke, irrespective of colour, whether issuing from a chimney or not, and to impose cumulative fines where it could be shown that no effort was made to abate the nuisance, this latter having particular reference to railway companies and their locomotives. Such a proposal has our whole-hearted support. But the Committee does not stop here. It points out that serious nuisance also arises from private houses. It is estimated that half of the smoke in London comes from this source, and at the present time these are unaffected by the law. Dr. W. N. Shaw, of the Meteorological Office, states that he finds from comparison of records that, owing to its smoke, London loses half of its sunshine in winter, and one-sixth in summer, and there can be no doubt that domestic grates contribute largely towards this evil. To abolish the open fire in favour of the closed stove system would sacrifice much of the fresh air inside living-rooms for which open fires are largely responsible. Although, owing to the very nature of its construction, it seems impossible to combine in the open grate the essentials of smokeless combustion unless anthracite coal or coke be exclusively used, careful experiment and enquiry have shown that there are several open firegrates on the market which secure excellent combustion of coal, and largely reduce the amount of smoke. The Committee is of opinion that to materially diminish domestic smoke it is necessary to educate public opinion on the subject. It does not propose at the present time to suggest any action to deal with the nuisance from this source, but it may be found necessary at some future time, unless public opinion brings about some radical improvement. The architectural profession and building trade ought to do their utmost to stop the evil by insisting on smoke-preventing grates in new buildings, and urging the use of smokeless fuels on every occasion.

A Prevalent Custom. When in the reign of Charles the Second a royal marriage made everything Dutch as popular as a few years before it had been the reverse, a style of architecture was introduced into England which was almost an exact copy of that of Holland. With it came the general adoption of the sash window, which spread with extraordinary rapidity. It has been revived in our own day, but its merits and demerits do not concern us here, save in one respect; it involves, and perhaps invites, the use of a certain amount of painted woodwork. Paint is a thing which has at least this advantage, that it may be of any colour; but it is remarkable how, of late, one colour seems to be superseding every other: this is white. Small buildings and cottages are "picked out" in white, and each window appears surrounded by a thick white band. The effect is often harsh, and the system—for such it has become—is only one more example of a good original spoilt by exaggeration; the old houses of the Dutch towns being fairly restful in effect. For interiors we have lately seen an enormous extension of the use of white. In new villas a white hall and white staircase are not unusual, the intensity of the colour (if we may call it so) being increased by abandoning the conventional form of balusters, and using thin, perfectly flat wood instead; when not overdone the result is sometimes pleasing. Passing into living rooms we find a feature which is fast becoming general—the frieze. This is a thing which is highly suitable to lofty rooms, but the indiscriminate application of which to very small houses and flats presents many difficulties, and often results in failure. It is a very common custom now for a frieze to consist of a plain band of dead white, usually very deep. If the proportions be not carefully studied—and how often does the average builder of villas study them?—the effect is to give the ceiling, which is white also, the appearance of beginning where the frieze begins, that is, of lowering it, and, as a rule, unnecessarily. Perfectly white furniture, often simple, but sometimes ornamented with Rococo detail, is also much used; but in the latter case a very sweeping change has been made from original Rococo work, where these mouldings and details are in light gold—the familiar "white and gold"—or the woodwork is left in its natural colour. The effect of white Rococo mouldings *upon* white is rarely satisfactory. White marble fireplaces are much less often introduced than formerly, but they have been succeeded by designs reproduced very largely from those of Robert Adam and his sons, and made of wood, and these again are white. And so is most of the detailed household work which is named after them. Some of this is now imitated in cast-iron, which, of course, is painted white, and the list might be extended indefinitely. Perhaps all this is only a passing fashion stimulated by a wish to have as much light as possible in our climate, but although white is undoubtedly clean and bright as a surface, internal woodwork never looks so well as when, circumstances permitting, it retains its natural colour.

SETTING-OUT A CEILING LIGHT.

By W. Young.

The drawings here reproduced show a ceiling light trapezoidal on plan. This light is not an everyday job; in fact, only once has the writer come across a similar one. The solution of the problem will not only be found of utility in itself, but of considerably greater service, as it is applicable to many varieties of circular or elliptical work.

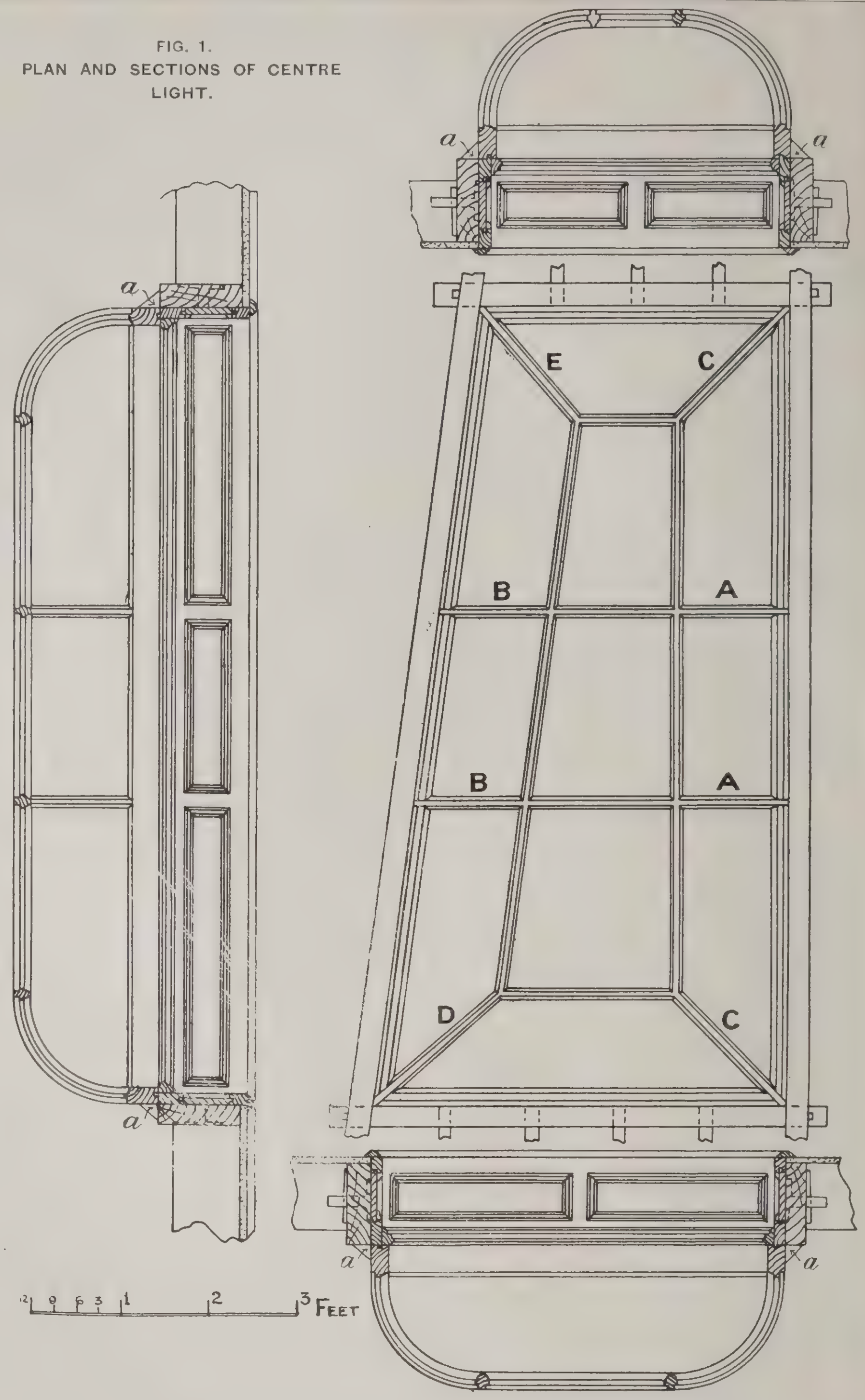
Fig. 1 shows a plan and sections of the light, while Figs. 2, 3 and 4 illustrate details of the construction.

The ceiling light is constructed of members which are moulded with a lamb's-tongue section 2½ins. finished thickness. The light has straight and circular bars and angle blocks (*a*) fixed to trimmers and light, as shown in the longitudinal and transverse sections in Fig. 1. It has 1½in. framed, panelled and moulded linings tongued together at the angles, with a 2½in. by 1in. ovolo moulding concealing the junction of the plaster ceiling against the lining. The last is tongued on its top edge into the 2½in. bottom rail of the ceiling light. A 2½in. by 1½in. moulding is mitred round at the joint of the light and the linings. The trimmer joist measures 3ins. by 11ins., the common joist 2ins. by 9ins.

Fig. 2 gives sections quarter-full-size of the trimmers, the common joist, the blockings, and the 1½in. framed linings, such as would be shown (but to full size) on the joiner's rod. The distance of one inch from the springing to the top edge of the bottom rail of the sash is the stilting which should always be taken advantage of wherever possible to obtain, as it gives the work a much better appearance and avoids the danger of cripples or apparent cripples. The trimmers are framed with the ordinary tusk tenons and keys, and the common joists are tusk-tenoned into them.

Fig. 3 (also quarter-full-size) gives sections of the bars. The angle bars are made up of two thicknesses, thereby ensuring sounder and cleaner work, besides dispensing with labour in the working of the internal angles. This needs to be well glued, but if the work is to be painted it may be screwed in addition, though this is not an absolute necessity if good glue and dry stuff be used. The common bars marked AA and BB in Fig. 1 may be obtained from one

FIG. 1.
PLAN AND SECTIONS OF CENTRE LIGHT.



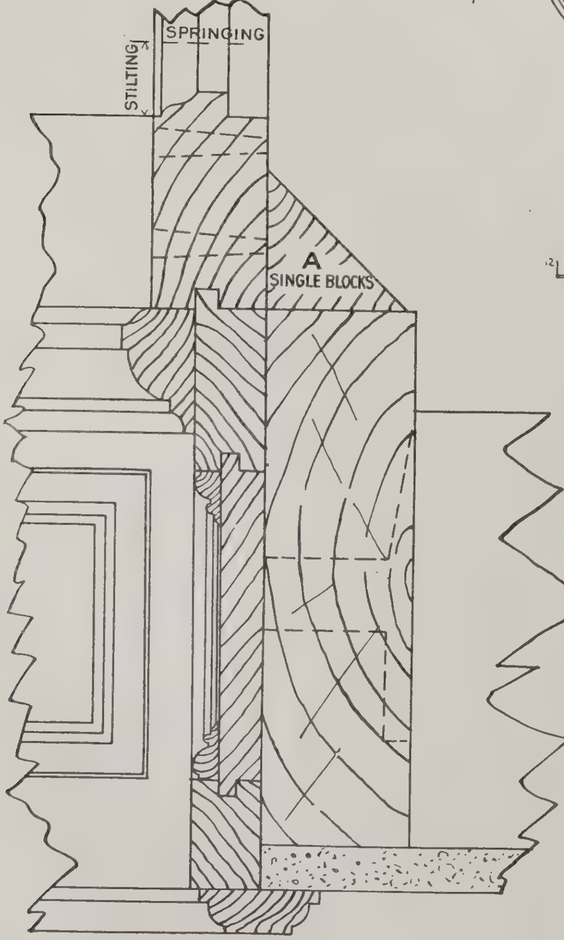


FIG. 2.

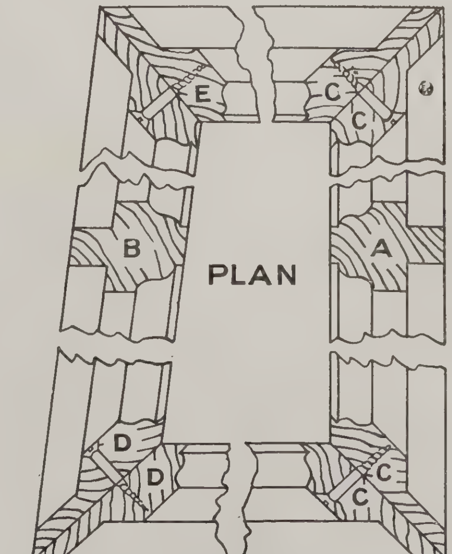


FIG. 3.

thickness of material, but it would be better to get the whole of the bars out of hard wood.

Fig. 4 gives details of setting out the common bars AA, with sections at springing and crown. The line shown below the springing again represents the stilting, and the shaded portions represent the bevel on the inside, and the dotted lines the backing on the outside. The two bars AA are cut from the face-mould marked AA on Fig. 4, and the same mould may be used for bars marked BB by pushing it out to the line for backing shown in section and drawing-in on the inside as shown by dotted line. After being cut out to full size the bars are bevelled off from nothing at top end to the section given at the springing, ordinates not being required. For the angle bars ordinates must be used, and the more ordinates used the more accurate the result. The length of the angle bars is taken from Fig. 1, and set out full size; then, by bringing the ordinates down from the common bar to the springing of the angle bars and setting up the heights as shown, 1, 2, 3, 4, &c., the shape of the face moulds will be readily seen, but in cutting these moulds sufficient length must be allowed beyond the stilting and beyond the centre line for the tenons. The sections given show backing and bevelling, the former by dotted lines and the inside bevelling by the shaded lines, dying off to nothing at the crown of the bars.

It will be advisable for all these bars to be fitted into their respective places before moulding them.

The horizontal or marginal bar should be dovetailed or keyed together, as it will be necessary to secure the angle bars to it with screws. The bars marked A and B would be either tenoned through and wedged, or stumped in and screwed.

Professor Henry Adams, M.I.C.E., M.I.M.E., &c., has been elected chairman of the Board of Examiners of the Royal Sanitary Institute.

Messrs. Shanks and Co., Ltd. of Barrhead, have been successful in obtaining the order for the sanitary appliances on board the King's yacht, now building in Glasgow. Messrs. Shanks are also busy finishing the sanitary appliances on the "Lusitania," building at Clydebank.

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional or legal matters.

Correspondents are particularly requested to be as brief as possible.

Polishing and Fuming Oak: Patches in Distemper.

NEWCASTLE.—A. R. writes: "(1) Which is the best method of imparting a dull polish to oak? (2) Is there any objection to fuming oak by the application of liquid ammonia? (3) Distemper on a plastered wall peels off in patches, owing possibly to sea sand in the plaster, as the patches show a sandy surface. How can this be prevented in re-distempering?"

(1) Apply "Matsine," thinned if necessary with turpentine, or use stained wax, which can be bought ready made for use. In either case try a small piece of the wood to get the right colour. (2) The fuming of oak by means of ammonia

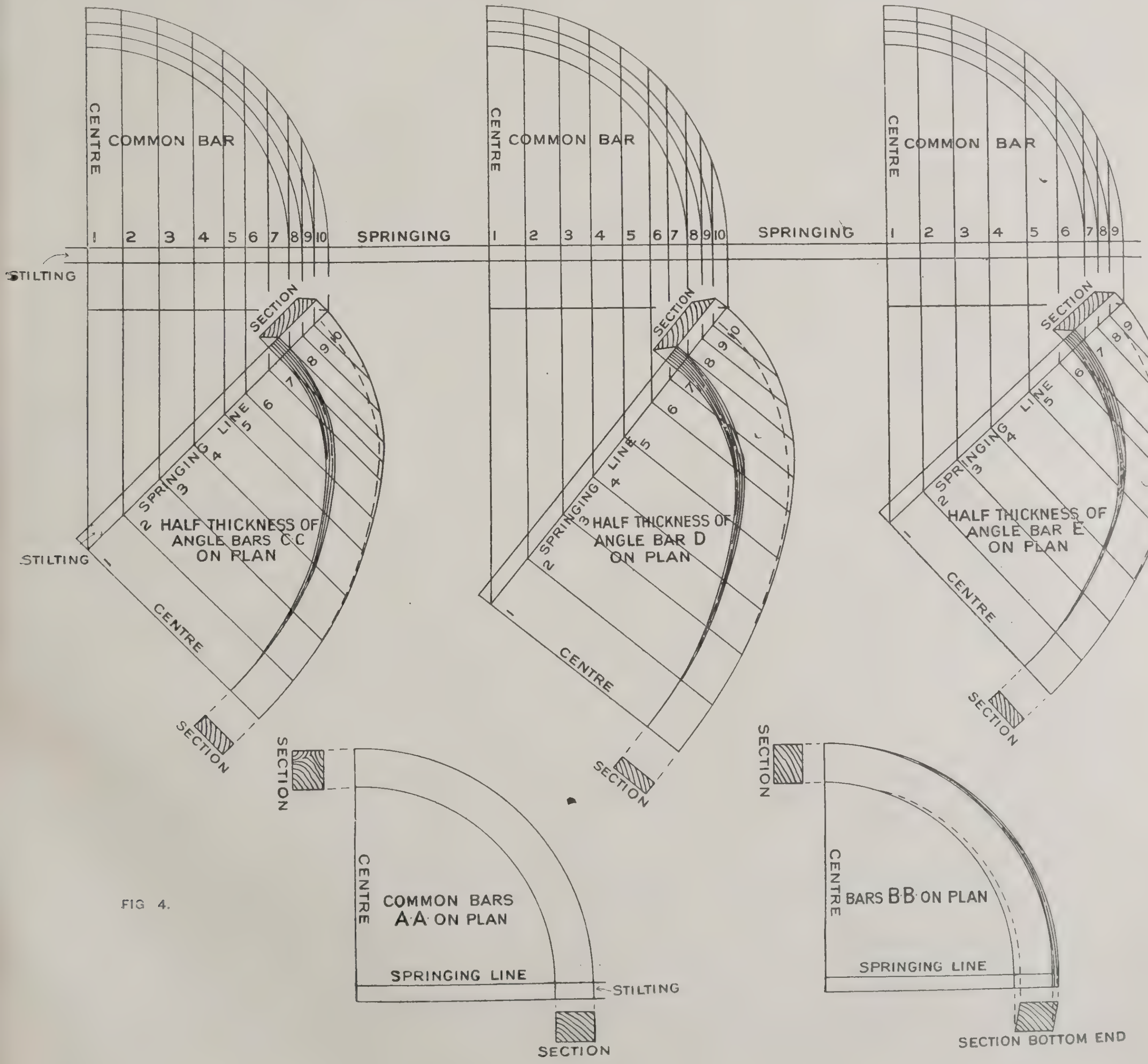


FIG 4.

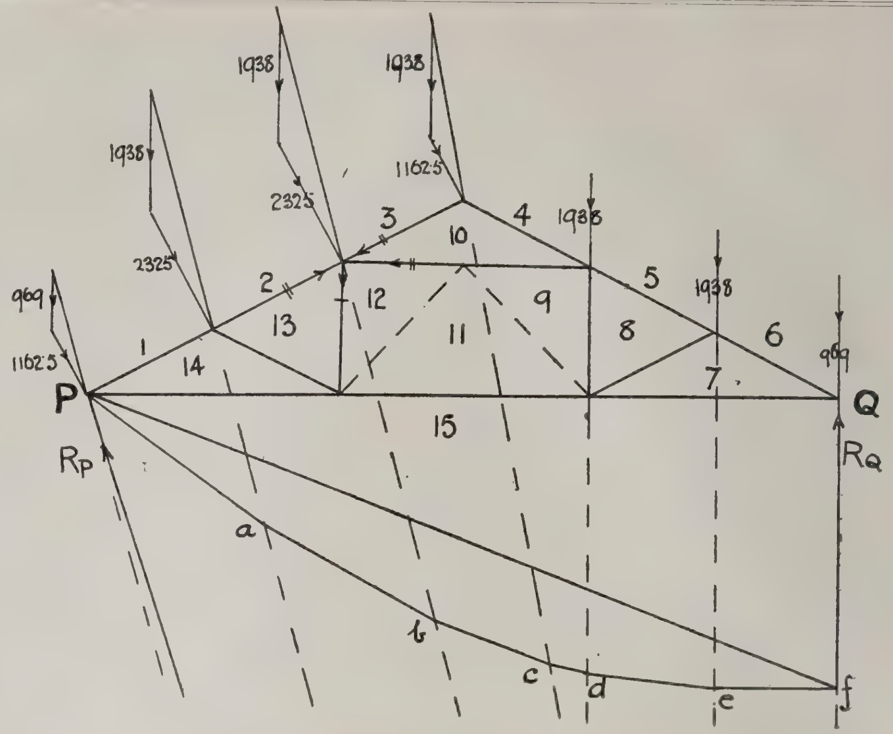
is not done by applying it to the wood, but by subjecting the oak to the fumes. For this purpose the article is enclosed in a box such as a packing case and some strong liquid ammonia is placed in an open vessel within it. To test the degree of darkening make a hole in the case and stick a piece of the oak in it so as to close the hole, and leave one end projecting within it. This end will, of course, be affected by the ammonia fumes and can be examined from time to time to ascertain how the darkening proceeds. Fuming by this process leaves no objectionable effects. (3) When sea-sand is used there is usually some sign of dampness owing to the salt it contains, but this would hardly cause the distemper to chip off. Probably a good coat of clearcoling will effect a cure. Thoroughly wash off the old distemper. Mix half a pound of concentrated size, dissolved in about 3 quarts of water, to ¾lb. of whiting soaked in a pint of water. Give a coat of this and follow with the distemper, taking care not to use too much size in its preparation, as this in itself will cause peeling off. Or better still use a good washable distemper such as Hall's. J.

Combined Dead and Wind Pressure Diagrams for Roofs.

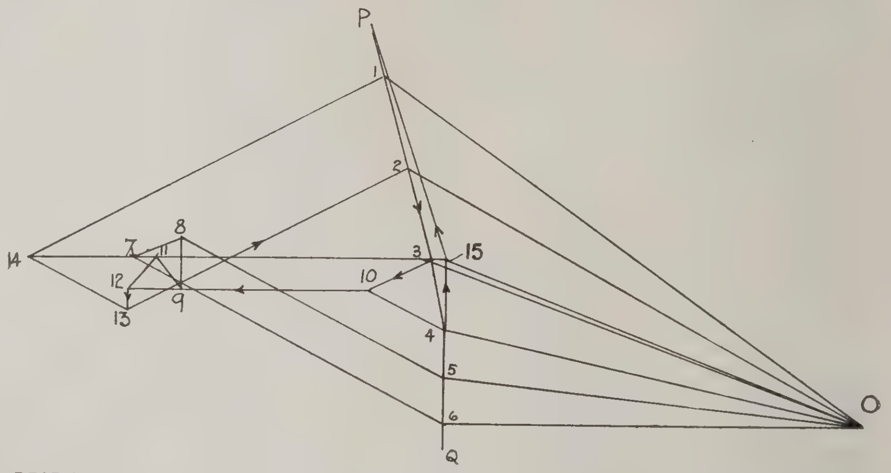
London. — Squint Quoin writes raising a number of queries with reference to the graphical method of obtaining the stresses in a roof truss subjected to combined dead load and wind pressure.

I will answer the various points raised by indicating the most satisfactory method of obtaining the stresses for combined dead load and wind pressure, taking, for example, the roof and loading given by querist. The first point to settle is the direction and magnitude of the reactions at P and Q. The most satisfactory assumption to make is such that all the horizontal thrust is taken by one of the reactions, or that one of the reactions, say R_q, is vertical. This is not necessarily the case unless Q is provided with an expansion bearing, but it is an assumption as reasonable as that in which both reactions are taken parallel to the resultant force, and as it gives greater stresses in some members it is to be preferred. Now, set down the forces on a vector line P, 1, 2, 3—Q (Fig. 2) and take any pole O, preferably on the side opposite to that on which the reciprocal figure will come: *then starting at the point P* and drawing the first link parallel to O1 draw the link polygon P, *a, b, c, d, e, f.* Join P*f* and draw O15 parallel to it, meeting the vertical through Q in the reciprocal diagram at 15; then Q15 gives the reaction R at Q, and 15 P gives the reaction R_p at P. The reciprocal diagram can now be drawn, and, if the work has been done accurately, it will be found to close correctly. The only reliable method applicable for all kinds of loading for distinguishing between compression and tension in the members is as follows:—Take any "node" or junction of bars in the frame figure, say that determined by the points 2, 3, 10, 12, 13 in the frame figure. This corresponds with the polygon 2, 3, 10, 12, 13 in the reciprocal figure and the force 2, 3 is in a known direction. Continue the sense of the arrowheads round this polygon as shown, and transfer the directions of the arrowheads to the corresponding bars near the node in the frame diagram. Then arrowheads pointing towards the node indicate compression (indicated =) and pointing away indicate tension (indicated —). This is a simple and never-failing method. The maximum stresses are usually obtained by taking the reaction as vertical on the side opposite to the wind, but some authorities prefer to draw also the reciprocal diagram, assuming R_p vertical or else keeping R_q vertical and taking the wind as blowing on the other side, which amounts to the same thing. This method enables the amount of variation of the stresses to be found, and, in view of recent investigations on the variations of stress, this is important. The query as to the direction of forces or moments to be taken is not clear. In above method no moments need be taken.

A.



DEAD LOAD AND WIND PRESSURE ON ROOFS: FIG. 1, FRAME DIAGRAM.



DEAD LOAD AND WIND PRESSURE ON ROOF: FIG. 2, VECTOR AND RECIPROCAL DIAGRAMS.

The Sainte Chapelle, Paris.

London.—L. writes: "Can you refer me to any book giving sketches of the joints used in the lower part of the timber framing of the flêche of the Sainte Chapelle, Paris?"

The most detailed book treating the construction and decoration of the Sainte Chapelle is one by Declasse and Doury, to be seen in the reference library of the R.I.B.A.

An old Churchyard Cross.

Portsmouth.—R. J. J. writes: "Can you give me the probable date of the old churchyard cross the remains of which are preserved at Catherington? Photograph sent (but not reproduced as it is not satisfactory)."

It is difficult to judge the date of the cross from the protograph you send, but it probably is of the same date as the earlier portion of the church—namely, Early Norman. The secretary of the local archæological society will probably be able to give you more information upon the subject.

H. Y. M.

Skelton Church, Yorks.

York.—F. M. writes: "I shall be glad to know of any books containing sketches or measured drawings of Skelton Church, near York."

There is an excellent book entitled "Illustrations of Skelton Church, Yorkshire," by the late Mr. Ewan Christian, containing a very complete set of measured drawings and sketches. This book is in the loan collection of the R.I.B.A. On reference to it you will doubtless be able to find all the information you desire about this church.

H. Y. M.

Church Roof Truss.

LEEDS.—A. W. writes: "Kindly give solution of roof truss shown by sketch (redrawn), method of drawing stress diagram for same, and size of timbers. Will this truss thrust out the wall? The 14-in. wall is 12ft. high and stands on an 18-in. wall 22ft. high. The trusses are 9ft. apart with windows 4ft. 6ins. wide by 7ft. high between each truss in the wall beneath, in two tiers."

Fig. 1 shows the proposed truss corrected according to the stresses to be resisted. All roof trusses of this kind give a more or less uncertain thrust. The frame diagram, made to suit the actual design, is shown in Fig. 2, and the stress diagram in Fig. 3. The thrust on the upper walls from the wind and load, divided equally over both sides of the building, is shown in Fig. 4, worked as follows:—First combine the weight *a b* of upper portion of wall with the thrust from roof *a c*, giving the resultant *a d*. Then produce *a d* to *e f* and combine with the wind-pressure *e g*, giving the resultant *e h* cutting the line at offset level 7½ins. inside the wall. From this it will be seen that the walls are not thick enough, and require substantial buttresses. When the lower part of the wall is considered it will be found that the structure is dangerous without buttresses or some other form of shoring or support. In a warehouse the floors help to stiffen the building and add weight to the walls to keep them in position, but a church has not that advantage.

HENRY ADAMS.

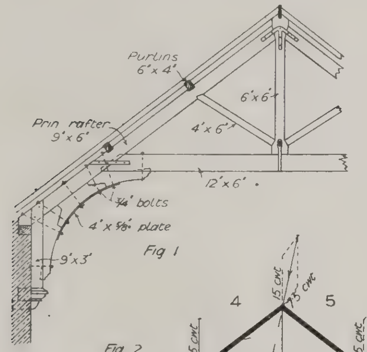


Fig 1

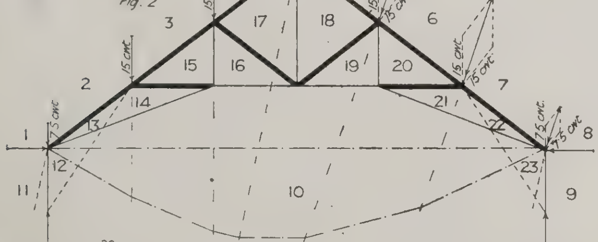


Fig. 2

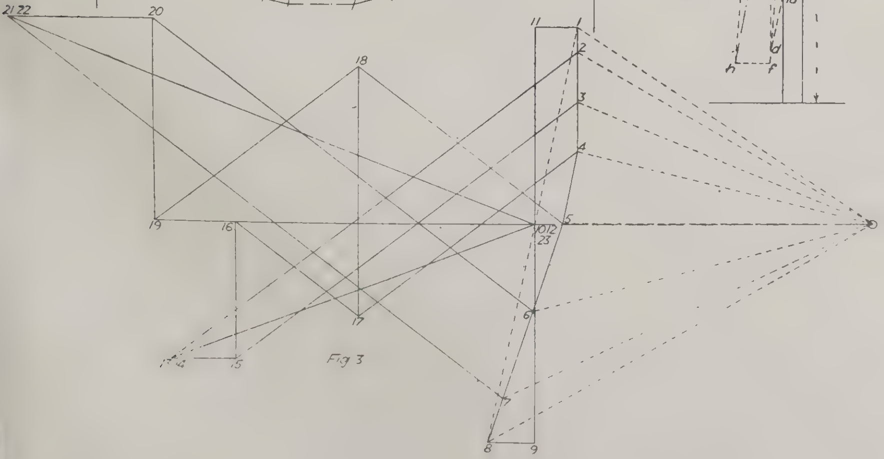


Fig 3

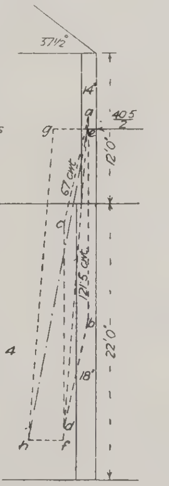
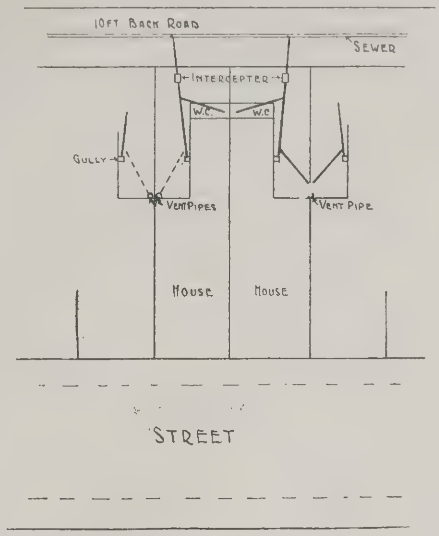


Fig 4

CHURCH ROOF TRUSS.

Vent Pipes to House Drains.

DONCASTER.—H. J. T. writes: "Can an urban district council compel me to put a 4-in. vent pipe to cottages? I am erecting 46, and this would mean a considerable outlay. I may say that the by-law has not been insisted upon until just recently. I send copy of by-laws: the one referring to above is No. 66. The accompanying plan shows the drainage. The dotted line indicates the vents as required by the council's surveyor, whilst the strong lines show the method I propose to adopt, which means connecting two house drains to one air shaft."



There is no doubt that under by-law 66, section 3, the district council can compel the erection of a ventilating pipe of not less than 4ins. diameter to each house drain. The fact that the by-laws have not been rigidly enforced in the past does not affect the present position at all. This practically also answers the second portion of your question, as I think it barely possible that any council would sanction the provision of only one ventilating shaft for each pair of houses: such an arrangement is distinctly contrary to the by-law you cite.

F. S. I.

Exhibition Buildings.

X. writes: "Have you ever published any detailed information or drawings of exhibition buildings; or do you know of any books dealing with these?"

Mr. James Miller read a paper on the Glasgow Exhibition buildings before the Architectural Association in March, 1902, in which he gave full details of the construction: you will find a report of the paper in our issue for March 12th, 1902.

Architects' Assistants for Canada.

BRIGHTON.—C.L.N. writes: "Kindly say how I may obtain a post as architect's assistant in Canada."

ABERTILLERY.—R.P.E. writes: "What is your opinion as regards prospects for architects and surveyors in Canada?"

The prospects in Canada are very good, particularly in the North-West. An assistant should have sufficient money to keep him for several months in seeking work on the spot.

Book-Keeping for Architects.

In further reply to the enquiry under the above heading on p. 296 of our issue for last week, our correspondent will perhaps finds the information he requires in an article on "Accounts for Architects," by Mr. H. C. Marshall on p. 43 of "Specification" for 1902 (No. 5).

Fixing Wall Tiles.

LONDON.—J. W. R. writes: "Which is the best material to use for fixing glazed white wall tiles 6ins. by 6ins. by ½in.? Would Keene's cement and putty be advisable, and what proportions do you suggest?"

The best means of fixing decorative tiles is undoubtedly to bed the tiles in neat Portland cement on a backing consisting of Portland cement and sand 1 to 1, laid on in the same manner as an ordinary rough coat of plaster. Another method often adopted is to use plaster of Paris with the addition of about 5 per cent. of lime putty, this being used to prevent swelling. A small amount of sized water, if added in the gauging, will retard the setting of the plaster and allow sufficient time to fix the tiles. If applied to woodwork the plaster must be gauged very stiff in order to prevent it swelling and warping the wood, which would prevent proper adhesion.

Notice to Terminate Wayleave.

TADCASTER.—DOUBTFUL writes: "A owns property, including yard fronting to street. B owns property adjoining yard, and, in consideration of yearly acknowledgment paid to A in advance on January 1st, is allowed a wayleave across yard to street. What notice must be given by A to B to terminate wayleave, and when?"

Arrangements of this kind should always be put into writing; but as the acknowledgment rental is in this case payable in advance, I am of opinion that the wayleave agreement may legally be terminated by a refusal to again accept the acknowledgment rental next January. The neighbourly thing to do, however, is to send a six-months' notice to the effect that the arrangement will not be renewed when the time again comes round, thus enabling B to make some other access to his property.

F. S. I.

Ventilating an Ice Safe.

LITTLEHAMPTON.—B. writes: "Which is the best way to ventilate an ice safe in a butcher's shop? The safe is made of 2-in. studding and double matchboarded, filled in with sawdust; size about 8ft. long, 3ft. 6ins. wide by 7ft. high. There is one ventilator at side close to the ceiling, 9ins. by 6ins., hit and miss, but it does not seem to admit enough air, as the meat decomposes quicker in the safe than in the shop. The ice is put into a large galvanised iron tank and the liquid water drawn off outside. Do you think the tank affects the meat? I have suggested putting two ventilators in the ceiling of the safe, which is 8ins. from the ceiling of the room."

Messrs. James Slater & Co., of 251, High Holborn, W.C., have kindly furnished the following information in reply to the above:—"It seems that your correspondent is not keeping the temperature of his cold room low enough; if he were to keep it between 32 deg. and 40 deg. Fahr. we do not think there would be any change of state, even if he did not have ventilation, and we think that he would find the existing ventilation was sufficient. The important point is a temperature low enough to prevent change of state. It is better in such cold rooms as described to have no iron plates: a wooden grating to hold the ice we believe to be better than the ice tank. For further information your correspondent had better consult Mr. P. Stockwell, of 63, Nunhead Lane, Peckham, S.E., who makes a speciality of these timber-construction ice-cooled rooms for butchers, hotel-keepers and others requiring only a limited accommodation."

Dampness in Basement.

A. B. writes: "Business premises were erected, and a basement used for storage purposes was built. Much water and soft ground were encountered. The ground was, therefore, excavated 10ft. or 11ft. down to the marl and a layer of concrete at least 1ft. thick was laid over the whole of the site excavated. The walls were built 18ins. thick with a 1-in. cavity 4½ins. from the inside. In this cavity, and on the concrete to the floor, 1in. of asphalt in a semi-fluid state was laid, care being taken to make the asphalt to floor and walls continuous. Over the asphalt on the floor blue chequered paving bricks were laid in cement. A month or two after the completion the basement began to show signs of damp, which soon became much worse, and now, nine months after completion, water collects in the course of a few days sufficient to fill up the grooves in the paving bricks. Assuming the asphalt was properly laid (which is believed to be the case), can you give any reasons for this dampness, and, more particularly, can you suggest any permanent remedy?"

Apparently the concrete over the site was not dense enough in structure; furthermore, concrete to be made water-tight should be floated with a trowel, and for preference have a 1-in. layer of cement and sand 1 to 1. Condensation might occur owing to bad ventilation, but apparently from the sketch you send (not reproduced) this is not the cause of the trouble. It is impossible for us to say with any exactitude what the collection of water is due to, more particularly as the information afforded is not very full. As regards the moisture which collects against the walls adjoining the staircase, the position suggests that the damp-proofing of the wall is defective, but the other spots right away from the walls suggest that the floor is defective, though it may be that the damp penetrates some distance away and only collects in the grooves in the paving at these points owing to hollows being formed there. As a way out of the difficulty we suggest taking up the paving bricks from the floor at the spots where damp is seen; it should then be possible by inspecting the asphalt to ascertain where dampness arises: these places should be cut out and fresh concrete and asphalt substituted. It may be necessary to remove a good deal of the paving in order to find the root of the trouble.

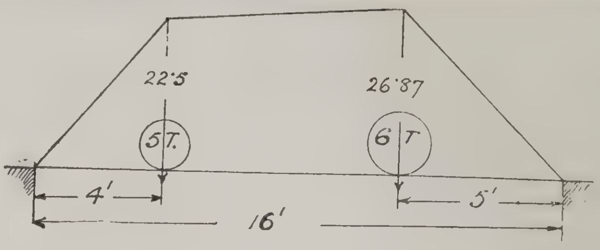


FIG. 1.

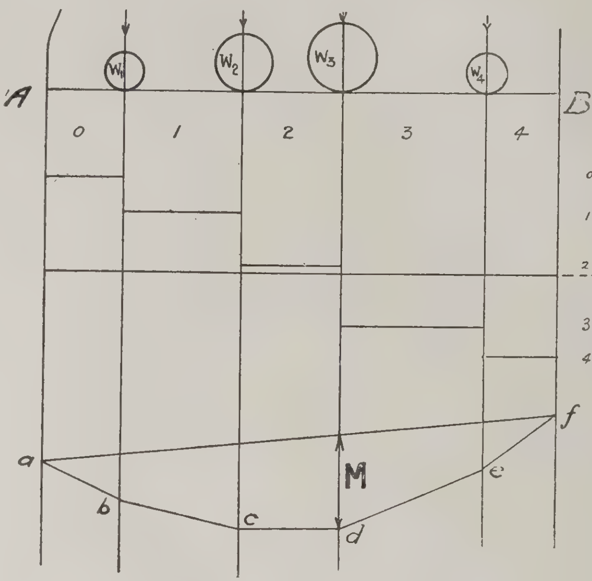


FIG. 2. IRREGULARLY LOADED BEAM.

Irregularly Loaded Beams.

SOUTHPORT.—STATICS writes: "How can I determine the central load on a beam which shall be equal to two or more loads at irregular distances from the supports? In one book consulted on the subject I find:—'Multiply each load by its distance from either support, and this product by the distance from the other support; add these products for the various loads and divide by the square of half the span of the beam.' An example is worked out as shown:—

$$\frac{(5\times4\times12)+(6\times5\times11)}{8\times8}$$

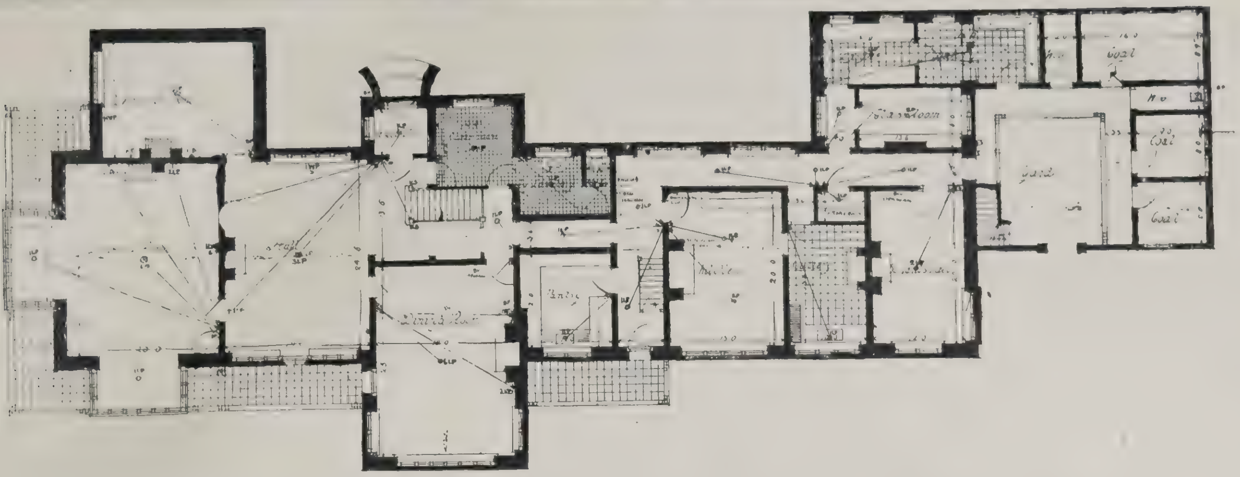
$= \frac{240+330}{64} = \frac{570}{64} = 8·9$ tons: central load $= 8·9$ tons. Now, this appears to give a much greater bending moment than any caused by the irregularly disposed loads. Will you kindly elucidate?"

The rule for finding the equivalent central load on a beam quoted by querist does not appear to be correct, and has not been previously met with by the writer. No such simple rule can be given. The simplest method of solution for more than two loads is the well-known graphical one, which is as follows:—Let W_1, W_2, W_3. W_4, &c., be a number of loads on a span A B. Draw verticals through the force lines and number the spaces between them; set down to convenient scale, 0 1, 1 2, 2 3, 3 4, to represent the loads on a vertical vector line. Take any point P at distance p from this line, and draw $a\ b$ parallel to P_0, bc parallel to P_1, and so on, and join $a\ f$. The maximum vertical ordinate M represents the maximum bending moment on the beam. The scale to which M is measured is obtained as follows:—Let 1in. on the load scale represent x tons, and let p be read on the space scale. Then the bending moment is read to the scale 1in. $= p \times x$ ft.-tons. To get equivalent central load (W) we remember that the maximum bending moment for such load is

$$\frac{W\times AB}{4} \therefore W = \frac{M\times4}{AB}$$
$$= \frac{4\times\text{max. bending moment}}{\text{span.}}$$

If the Px be drawn parallel to af, then $4x$ is the reaction at B, and xO that at A, and the shear diagram is obtained by projection from the vector line as shown. If the load is continuous it can be divided up into a convenient number of portions and the load of each portion considered as acting down the centre line of each. The graphical construction is then proceeded with as in the case shown in the figure. The proof of this construction is given in most of the reliable text-books on the subject. In the example cited by the querist, Fig. 1, the maximum bending moment is 26·87 ft.-tons: ∴ the equivalent central load is $\frac{26·87\times4}{16} = 672$ tons.

A.



"EYEHURST," CHIPSTEAD, SURREY: GROUND-FLOOR PLAN. REGINALD MORPHEW, ARCHITECT.

Our Plate

"Eyehurst," Chipstead, Surrey.

This house, situated in one of the most beautiful parts of Surrey, stands about 500ft. above the sea-level and commands extensive views towards the south-east and south-west. It has been planned so as to take every advantage of these views. The principal materials used in the elevations are red bricks and tiles with timber-framed bays. The hall and dining-room are panelled in oak, and have open timber ceilings. Mr. Reginald Morphew, of 10, New Square, London, is the architect, and Mr. Walter Wallis, of Balham, is the contractor.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
June 24	REMODELLING OF SMITHFIELD, UTTOXETER (for cattle, sheep, pigs and calves).—Premium £20, for plan, specification and estimate. Particulars from F. S. Hawthorn, clerk, Council Offices, Uttoxeter.
July 1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5, Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth. Summary in "Builders' Journal," May 22nd.
July 1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown. Summary in "Builders' Journal," May 22nd.
July 2	CARNEGIE LIBRARY AT KILKENNY. —To cost £1,800. "Design, specification, and bill of quantities." Particulars from E. O'Connell, Town Clerk, City Hall, Kilkenny.
July 6	ZION INSTITUTIONAL CHURCH. MANCHESTER.—Limited to Manchester architects. Particulars from J. S, Gibson, 5, Old Bond Street, London, W.
July 20	SANATORIUM AT CORK (for 70 patients). Premium of £100. Particulars (price 10s.) from E. J. Murphy, secretary to Co. Cork Joint Hospital Board, Court House, Cork.
July 30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth. Summary in "Builders' Journal," May 22nd.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept. 2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept. 2	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN. — Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in "Builders' Journal," May 1st.
	ELEMENTARY SCHOOL AT STOCKTON HEATH for 500 children. Conditions from G. F. Ashton, Clerk to Education Committee, 71, High Street, Runcorn. Deposit £2 2s.

Notes on Competitions

Edmonton Workhouse Infirmary.

Mr. Rowland Plumbe, the assessor appointed by the Edmonton Board of Guardians, has made his award on the competitive designs sent in by five selected architects for the new workhouse infirmary. Mr. Plumbe gives his decision in favour of the drawings of Mr. Stuart Hill, which provide accommodation for 812 beds. Mr. Hill's estimate of the cost of carrying out his design is £152,640.

Scottish National Exhibition, Edinburgh, 1908.

We have received some particulars of the award in this competition "with the manager's compliments." From these we extract the following: — "Mr. Campbell's plans, which gained the first award, showed a much more imposing group of buildings than those of Messrs. Walker and Ramsay, but the Exhibition Committee were impressed with the more businesslike arrangement of the latter, and decided to appoint the firm architects of the Exhibition. The buildings, with the exception of the Fine Arts section and Concert Hall, are to be of timber covered with lath board and plaster. The Fine Arts building will be constructed of steel and brick, and will be fireproof." There is no legitimate reason for the overriding of the assessor's award in this competition, especially (as we pointed out last week) in view of the specific condition on the matter. The practice of promoters setting aside the assessor's award should be vehemently opposed by all architects. There have been several cases of it lately. The Castleford Secondary School Competition is one in point. We understand that a further meeting about this was held last night by the Governors.

Sunderland Libraries Competition.

At last Wednesday's meeting of the Sunderland Town Council the Museum and Library Committee brought forward a report as to the premiated designs for the branch libraries at Kayll Road, Church Street North and Villette Road. They recommended that the author of the first-premiated design for the Kayll Road library (Mr. Hugh T. D. Hedley) should be appointed architect for that building, but that the second-premiated designs for the other two libraries were preferable, "from an administrative point of view," to the designs placed first. Considerable discussion followed, and it was ultimately decided that the matter should be further considered in committee. In this case Messrs. Davidson and Cratney were the authors of the first- and second-premiated designs for the Church Street North and Villette Road libraries: but, in principle, the setting aside of the award is the same, and subject to the same adverse criticism. We believe that a good deal of quibbling has been going on because Messrs. Davidson and Cratney have offices at Newcastle as well as Sunderland, and influence has been brought to bear on the ground that an entirely local architect should be given the work. Such influence is not limited to Sunderland: it is a favourite means of trying to evade a fair award. The architects placed first should be instructed to proceed without any further delay. It is the only honourable thing to do.

Obituary.

Mr. J. A. Chatwin, F.R.I.B.A., of Birmingham, died on June 6th, aged 78. He was a pupil of Sir Charles Barry, and assisted in making the drawings for the House of Lords. When he had completed his articles he commenced practice in Birmingham, and won a reputation for ecclesiastical architecture. St. Martin's Church, the parish church of Birmingham, is one of his works. He was entrusted with the restoration of many Warwickshire churches, among them Aston Church. Among public and private buildings erected from his designs are the Wolverhampton Art Gallery, the Great Western Hotel, Colmore Row, Birmingham, the head offices of Lloyd's Bank, and many of the branches. He was also architect to the governors of the King Edward's Foundation.

Dennison, Kett & Co.— Under this style Mr. E. W. Dennison (formerly for twenty-seven years with Messrs. Clark, Bunnett and Co., Ltd., now in voluntary liquidation) has entered into business with Mr. F. Steer and Mr. George Kett, M.I.M.E. The firm has offices at Mansion House Chambers, 11, Queen Victoria Street, E.C., and has taken up works at 61 and 63, Lant Street, Borough, S.E., fitted with electrically-driven machinery, for the manufacture of steel, iron and wood shutters, and Dennison's patent collapsible gates, as well as lifts of all descriptions. The firm has already been favoured with orders from the War Office, the London County Council, and the Metropolitan Asylums Board.

Notes and News

The New Cathedral for Washington, of which Mr. Bodley is the architect, is estimated to cost £1,000,000. The plan is that of nave and aisles, transepts, choir and two chapels. The total length will be 476ft., width 132ft., with a central tower rising to a height of 220ft. The style is fourteenth-century Gothic. Next September the corner-stone will be laid.

A Day School at Leek is to be erected in connection with the Congregational Church. The new school will take the place of an existing one in Union Street, and will have accommodation for 200 girls and 100 infants. The architect for the work is Mr. Reginald T. Longden, of Burslem and Leek, who is also the architect for the new Congregational Church and schools at Wolstanton, Stoke-on-Trent.

An unusual Stone-laying took place recently at a new Sunday-school in course of erection at Burslemett, Brightside, **Sheffield.** The parents of a scholar belonging to the old Sunday-school wished their 3½-year-old daughter to lay a memorial stone in the wall before completion. This was done with much difficulty, the child being handed through an upper window on to a high scaffold specially erected for its safety. Having been raised to the required position the child proceeded in the usual manner to lay the stone, and was then lowered again into its mother's arms.

Sir A. B. Thomas and the Belfast Corporation.—Sir A. Brumwell Thomas, architect of the new City Hall at Belfast, has accepted the amount lodged in court by the Law Committee of the Corporation in answer to his action for balance of fees, which action is accordingly withdrawn. The amount claimed by Sir A. Brumwell Thomas was £21,758 and the amount of the settlement is £12,601, a difference of £9,157 in favour of the Corporation. There still remains the vexed question of the final certificate of the architect for payment to the contractor of the balance of the building account. Something like £60,000 is at issue in connection with this account.

Godalming Municipal Buildings.— Tenders have been received by the Godalming Town Council for the erection of a new Police-court and Council Chamber on a site in Bridge Street, and it has been decided to accept the lowest, received from Messrs. Cook and Sons, of Crawley, subject to the Local Government Board sanctioning a loan of £4,000, for which application has been made. Messrs. Cook and Sons' tender amounted to £3,522, but this will be increased by £200 to cover certain extra work. The new buildings have been designed by Mr. J. Herbert Norris, the Borough Surveyor. A limited competition for municipal buildings and fire-engine house and stables, proposed to be erected on the same site, was held in 1898, when the design submitted by Messrs. Lanchester, Stewart and Rickards was placed first by the assessor, Mr. E. W. Mountford. The competition was reported in our issue of November 16th, 1898. Tenders were obtained for the work, but it was eventually decided not to proceed with the scheme. A fire staion has since been built on another site.

Change of Address.—Mr. Charles R. Price, builder and contractor, of 145, Church Street, Stoke Newington, has removed his offices to the City—139, Bishopsgate Street Without. Telephone No. 2565, London Wall.

A Churchyard Cross.— The churchyard cross at Over Peover, near Knutsford, has been re-erected in memory of the late Sir Philip Mainwaring. The original cross was destroyed in the seventeenth century, but the steps and base survived. These have now been very carefully reset on a firm foundation, but not repaired in any way, and a new shaft and head 11ft. high has been added. The new work is of Portland stone, and the head consists of an open canopy with a gabled roof, under which the figures of our Lord on the Cross, with St. Mary and St. John, stand clear against the sky. The whole work, including that about the base, has been carried out by Messrs. Farmer and Brindley, from the design of Mr. H. S. Rogers, of 7, Dean's Yard, S.W.

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Cardiff.—Accepted for alterations and new refreshment rooms at Cardiff Station, for the G.W.R. :—

Ernest T. Bevan, Penarth.

Chippenham.—For erecting business premises, for Mr. W. C. King. Mr. R. E. Brinkworth, F.S.I., 16, Old Bond Street, Bath. Quantities by Messrs. Amor & Underwood, Bath :—

Hayward & Wooster	£2,898
J. Long & Sons	2,883
A. Wills & Sons	2,857
E. Chancellor & Sons	2,687
Downing & Rudman	2,577
G. Moore & Son	2,375
W. Light, Son & Co.,* Chippenham	2,281

* Accepted.

Dudley.—Accepted for erection of Wesleyan chapel in Dudley Wood Road. Mr. Wm. F. Edwards, architect, 1, Newhall Street, Birmingham, and Blackheath :—

J. Harper & Sons, Blackheath, Staffs £1,314

Eastbourne.—For the erection of new infants' school and cookery centre in East Street, for the Education Committee :—

Feast & Jones	£6,040	0	0
E. J. Bowles, Ashford	5,980	0	0
A. W. King & Son	5,772	10	0
M. Hookham	5,597	0	0
Miller & Selmes	5,448	0	0
Jarman, Daws & Co., Richmond	5,359	0	0
R. Cook & Sons, Crawley	5,240	0	0
J. White	5,231	0	0
E. Cornwell & Sons	5,100	0	0
W. Brown & Son, Brighton	5,039	0	0
C. Peerless-Dennis & Co.	4,900	0	0
J. Martin*	4,861	0	0

* Accepted.

Farnham.—Accepted for the erection of a cottage at the rear of "Highlands," Farnham Common, Bucks, for H. J. Dowsing, Esq. Mr. J. Wornell, architect, Estate Office, Beaconsfield Road, Farnham Common :—

Burfoot & Butler, Slough £152 10 0

(Owner does excavating and supplies sand and gravel.)

Godalming.—For the erection of municipal buildings, and alterations and additions to the borough hall, for the Corporation. Mr. J. H. Norris, borough surveyor :—

Higgs & Outhwaite, Cobham	£4,137
Stephens, Bastow & Co., Bristol	3,998
Drowley & Co., Woking	3,950
Haslemere Builders' Co., Haslemere	3,938
Mussellwhite & Sapp, Basingstoke	3,933
Mitchell Brothers, Shalford	3,913
Smith & Sons, Norwood	3,819
Martin, Wells & Co., Aldershot	3,800
Milton & Sons, Witley	3,790
G. Kemp, Aldershot	3,779
McC. E. Fitt, Reading	3,772
D. Fry, Godalming	3,754
Cropley Brothers, Epsom	3,694
Billet & Musselwhite, Salisbury	3,649
Goddard & Sons, Farnham	3,628
Jarman, Daws & Co., Richmond	3,599
Cook & Sons,* Crawley	3,522

* Accepted subject to sanction of Local Government Board.

Leek.—Accepted for the erection of a new laundry at the Workhouse, for the Guardians :—

T. Grace £3,245

London, E.—For the erection of new offices and factory, for the Zeta Wood Flooring Co., at Stratford. Mr. J. Hamilton, architect :—

H. J. Smith	£2,016
W. Nash	1,714
J. Jarvis & Sons	£1,635
W. Irwin	1,611
W. Shurmur & Sons	1,566

Llanhilleth (Mon.).—Accepted for the erection of new parish church. Mr. E. A. Johnson, architect, Abergavenny :—

Ernest T. Bevan, Penarth.

London, S.W.—For making-up and paving Hazlewell Road, Putney, for the Wandsworth Borough Council :—

S. Kavanagh & Co.	£2,763	0	0
W. H. Wheeler	2,594	0	0
T. Adams	2,581	13	3
E. & E. Iles	2,541	19	8
F. Hoffman	2,485	11	10
T. Woodham & Sons	2,479	0	0
J. Mowlem & Co.	2,470	0	0
J. Mears	2,447	0	0
E. Parry & Co.	2,375	0	0
J. E. Etheridge*	2,150	0	0

* Accepted.

London.—For the supply of the remaining 400,000 stoneware cable-ducts required for tramway works, for the London County Council :—

Name of firm tendering	No. of ducts t'nd'r'd for	Rate per 1,000 ducts	Amt. of tender
Stanley Bros., Ltd.,* Nuneaton	400.000	£11 0 0	£4,5[illegible]0
Gibbs & Canning, Tamworth	100,000	11 15 0	1,275
George Skey & Co., Ltd., Tamworth	160,000	11 17 6	2,000
James Woodward, Ltd., Swadlincote	400,000	12 0 0	4,900
Hosea, Tugby & Co., Ltd., Moira, near Ashby-de-la-Zouch	400,000	12 9 6	5,090
H. R Mansfield, Burton-on-Trent	400,000	12 9 6	5,090
Robinson & Dowler, Overseal, near Ashby-de-la-Zouch	200,000	12 10 0	2,600
Sutton & Co., Overseal, near Ashby-de-la-Zouch	200,000	12 10 0	2,600
Donington, Sanitary Pipe and Fire Brick Co., Ltd., Moira, near Ashby-de-la-Zouch	100,000	13 15 0	1,475
Doulton & Co., Ltd., London	200,000	14 0 0	2,900
Ensor & Co., Ltd., Woodville, near Burton-on Trent	100,000	15 0 0	1,600
Thomas Wragg & Son, Ltd., Swadlincote	400,000	15 0 0	6,100
George Jennings, Parkstone, Dorset	100,000	15 0 0	1,600
Leeds Fireclay Co., Ltd., London	200,000	16 17 6	3,475

On the last occasion on which tenders were invited for the supply of cable-ducts, the lowest price quoted was £15 a 1,000, and the same price was quoted by 12 of the 15 firms tendering, most of whom tendered for a uniform quantity of 100,000 ducts each. It will be seen from the above list that the lowest of the tenders now received is for the whole of the ducts asked for, and is at the rate of £11 a 1,000 ducts. The Committee observe with regard to this :—" We know of no facts which account for the high prices which obtained when the original tenders were invited, and we are glad to note that the prices are now lower than before."

* Recommended for acceptance.

Merthyr Tydfil.—For the erection of a children's ward at the new Infirmary, for the Guardians :—

W. E. Wills, Ystrad Rhondda	£2,550	0	0
J. Williams, Merthyr	1,849	8	6
W. Jones, Merthyr	1,771	0	0
J. Jenkins,* Merthyr	1,767	0	0
W. Williams, Cardiff	1,730	0	0
Hughes & Sterling, Bootle	1,687	0	0
Hatherly & Co., Penarth	1,597	0	0

* Accepted.

Redditch.—For the erection of new club premises, for the Union Club. Mr. J. Johnson, architect, Redditch. Quantities by architect :—

Pitts	£2,147
Tilt Brothers	1,999
Yeoman	1,984
Surman	1,925
Dallow & Son	1,900
Huins & Son	1,845
Cragg	1,750
Edkins,* Redditch	1,740
Marshall	1,710

* Accepted.

Preston.—Accepted for the erection of branch stores and four houses at Tardy Gate, near Preston. Mr. Munford, architect, 12, Guildhall Street, Preston :—

T. & R. Colley, Preston £2,053 17 6

Weston-super-Mare.—For the sewering of Milton, for the Weston-super-Mare U.D.C. :—

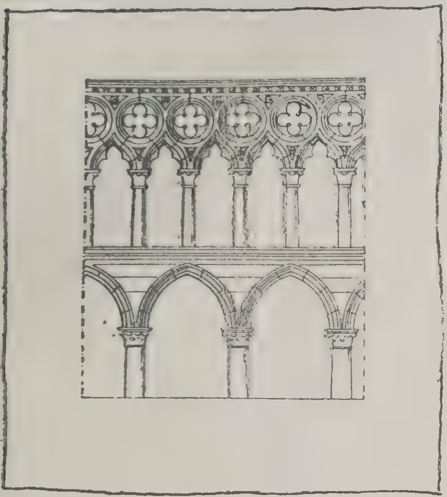
H. W. Pollard, Bridgwater	£8,021	7	6
J. Best & Sons, Edinburgh	7,003	15	6
G. Bell & Sons, London	6,617	9	9
B. Firth & Co., London	6,410	0	0
G. Rutter, Barry	6,275	0	0
Mereweather & Sons, Bristol	5 898	1	3
Forse & Sons, Bristol	5,890	0	0
G. Pollard & Co., Taunton	5,886	5	6
E. Ireland, Chippenham	5,651	19	6
J. Coles & Son, Weston-super-Mare	5,592	0	0
A. G. Osenton, Havant	5,500	0	0
F. W. Trimm, Dorking	5,457	0	0
W. Hill & Co., London	5,455	5	2
M. Lovel, Bristol	5,095	0	0
A. E. Nunn, London	4,902	0	0
T. B. Cooper & Co., Bristol	4,800	0	0
F. Mitchell & Son, Manchester	4,660	12	0
W. Moss & Sons, Loughborough	4,556	0	0
F. Osenton, Staines	4,539	0	0
H. V. Smith & Co., Westminster	4,369	12	6
J. Riley, Cheltenham	4,307	8	5
J. H. Macdonald, Oxford	4,253	6	1
R. H. B. Neal, Ltd.,* Princess Square, Plymouth	4,154	13	1

* Accepted.

ARCHITECTURAL DIS-ORDERS COMPETITION.

(Twentieth Series.)

CLASS A (ARCHITECTURE).



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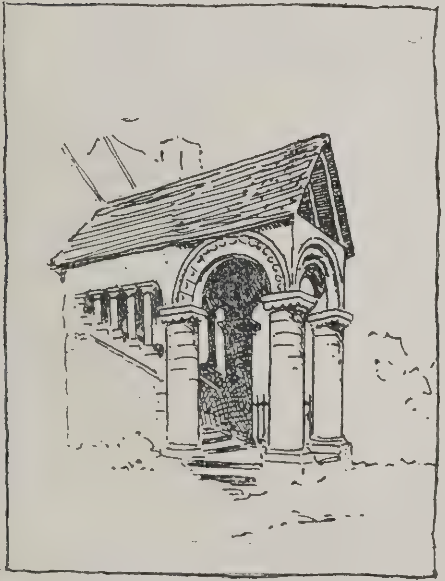

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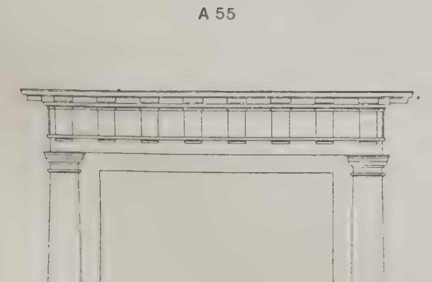


A 56

This competition has been instituted with the object of increasing the circulation of THE BUILDERS' JOURNAL by bringing it before members of the architectural profession and the building and allied trades who are not already subscribers, but only need to be encouraged to take it regularly for a time in order to find that they would lose much without it.

The task set is to discover in what respect each of the pictures published is wrong. There is in each an error, or errors, either in construction, draughtsmanship or design.

The Prizes.

The proprietors of THE BUILDERS' JOURNAL offer a special money prize to the total value of £20 to the reader or readers submitting the largest number of correct solutions. The winner, or winners, of this special prize will not be eligible for any of the other prizes offered. The remainder of the prizes are divided into two classes :—

Class A (Architecture).

1st Price.—£10.

And twenty-four other prizes—cases of instruments, &c.—particulars of which have been given in former issues.

Class B (Building).

1st Prize.—£10.

And twenty-four other prizes—Abney level, *Napier* compass, builders' rods, &c.—particulars of which have been given in former issues.

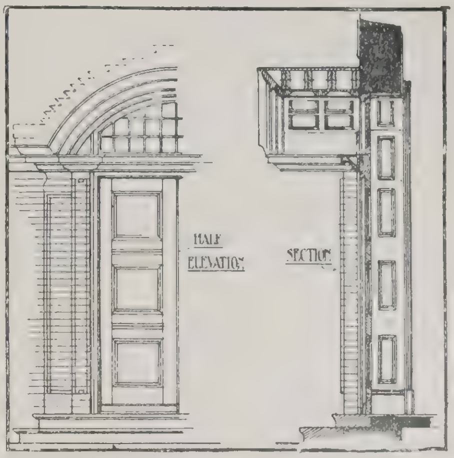
Conditions of the Competition.

1. Solutions must be retained and sent in when the publication of the drawings is concluded.
2. All solutions must be sent in within one calendar month from the date of the publication of the concluding drawing of the series. Foreign readers will be given an additional month.
3. All solutions must be addressed to the Editor of THE BUILDERS' JOURNAL, 6, Great New Street, London, E.C., the envelopes being marked "Competition."
4. The special and first prizes will each be awarded to the competitor or competitors who succeed in correctly solving the largest number of the problems. The other prizes will be awarded, in order, to the competitors who correctly solve the next largest number of problems.
5. In the event of a tie or ties for any of the prizes, the Editor reserves the right of deciding how the prizes shall be divided.
6. No persons directly or indirectly connected with the staff of THE BUILDERS' JOURNAL, the "Architectural Review," "Specification," and the "Municipal Engineers' Specification," or any of the publications of Technical Journals, Ltd., will be eligible for a prize.
7. Solutions must be written legibly on one side of the paper, and must be numbered to correspond with the series to which they relate. There is no need to cut out the pictures, but each issue containing a set of pictures will also contain a coupon entitled "Architectural Dis-Orders Competition," and this must be cut out and attached to the back of the sheet containing the solutions. Thus at the end of the competition each competitor will have to submit 26 sheets of paper giving the solutions, and somewhere on the back of each sheet must be pasted one coupon.
8. Competitors may send in as many sets of solutions as they please, but each set must be accompanied by 26 coupons.
9. Competitors must write their names and addresses legibly on each sheet of paper on which their solutions are written.
10. Any violation of these rules will entail disqualification.
11. The Editor's decision on every matter will be final.

(*For Coupons see page xxvii.*)

Copies of "THE BUILDERS' JOURNAL" containing the competition pictures can now be obtained from the Publisher. The series commenced with the issue for February 6th and has been continued in all the subsequent numbers.

CLASS B (BUILDING).



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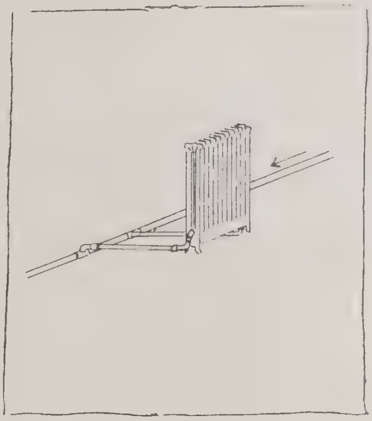

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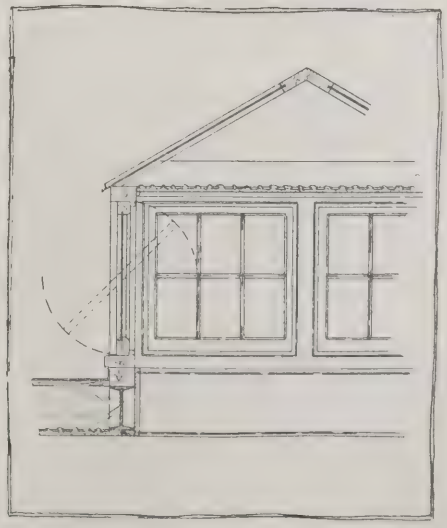

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Complete List of Contracts Open.

WITH a few exceptions, news of Contracts Open are not repeated after they have been published once in these columns, so that readers will find particulars in our previous issues of other contracts that still remain open.

Unless expressly stated to the contrary, all deposits required for bills of quantities, &c., are returned on receipt of *bona-fide* tenders.

The words "Fair Wages Clause" inserted in certain paragraphs signify that persons tendering must conform to a fair-wages clause in the contract, which requires them to pay the rates of wages current in the district.

BUILDING.

June 20. Cranborne.—*Re-roofing Cranborne Parish Church.* Tenders to be sent to the Churchwardens, Cranborne, Dorset, not later than June 20.

June 20. Crook.—*Erection of portion of factory* at Crook. Plans, &c., may be seen with T. H. Gradon, architect, Market Place, Durham, and bills of quantities obtained on payment of a deposit of 20s. Tenders to be delivered to above not later than June 20.

June 20. Alnwick.—*Construction of new cattle market* and auction mart in field at Wagon Way, including sewerage, water supply, stone wall and fencing, metal penning, cement concrete pavement, and mart ring building. Plans, specifications, and conditions are to be seen and forms of tender obtained at U.D.C. Offices, Green Batt, Alnwick, where sealed tenders, endorsed "Cattle Market," are to be sent in addressed to Market Committee, by 6 p.m. on June 20.

June 20. Treherbert.—*Erection of 57 houses* at Treherbert, Rhondda Valley. Plans may be seen, and specifications had with Mr. J. D. Walters, Maesgwyn, Treherbert, on receipt of £2 2s. All tenders to be sent to E. Thomas, secretary, Margaret Street Building Club, 3, Station Street, Treherbert, endorsed and sealed, on or before June 20.

June 20. Cymmer (Port Talbot).—*Construction of a culvert* over Nantgwyn Brook at Abergwynfi for a distance of 20yds. Specifications may be obtained from the Council's Surveyor (W. P. Jones), Cymmer, Port Talbot, to whom tenders must be sent on or before June 20.

June 21. Tenby.—*Re-building, &c.*, the following:—"Tellings Cottage," Saundersfoot; "White Park Cottage," Saundersfoot; "Zealand House," Saundersfoot; "Garnons Cottage and Outbuildings," Taylor's Park, near Tenby. Plans and specification can be seen at the office of the architect, T. Roderick, of Aberdare, or with F. Coles, Esq., Hean Castle, Saundersfoot, to whom endorsed tenders must be sent not later than June 21.

June 21. Cleator (Cumberland).—*Erection of cottage* to the Police Station and painting and papering works. Sealed and endorsed tenders, upon the forms provided for the purpose, are to be delivered to G. D. Oliver, F.R.I.B.A., county architect, Carlisle, not later than June 21.

June 22. Edinburgh.—*Mason work*, Canonmills School, and joiner work at Broughton Higher Grade School, for the Edinburgh School Board. Schedules of measurement may be obtained and drawings seen at the office of Mr. Carfrae, architect, 3, Queen Street, Edinburgh. Estimates, duly marked on outside, must be lodged with the Clerk, School Board Offices, Castle Terrace, Edinburgh, on or before June 22.

June 22. Ferryhill.—*Erection of new public-house* at Ferryhill, for the N.E. Breweries, Ltd. Plans and specifications may be seen at the King's Head Inn, Ferryhill. Tenders to be sent to T. H. Murray, architect and surveyor, Consett, not later than June 22.

June 22. Edinburgh.—*Enlargement of Portobello Higher Grade School.* Schedules of measurement may be obtained and plans seen at the office of Mr. Carfrae, architect, 3, Queen Street, Edinburgh. Estimates, duly marked on outside, to be sent to G. W. Alexander, clerk to the Board, School Board Offices, Edinburgh, not later than June 22.

June 22. London.—*Erection of new branch stores* in High Road, Tottenham, for Edmonton Co-operative Society. Drawings, specification, and a copy of conditions may be seen on application at the office of the Society's architect, H. S. Couchman, 522, High Road, Tottenham, on and after June 22. Bills of quantities and forms of tender may be obtained at the undermentioned address on payment of £1 1s. Tenders must be delivered before 5 p.m. on July 9, addressed to the Secretary, the Edmonton Co-operative Society, Shrubbery House, Edmonton, and endorsed "Tender for New Branch Store."

June 24. Swansea.—*Erection of a parish hall* at the rear of Christ Church, Swansea. Plans and specifications may be seen and quantities obtained from W. Cousins & Son, architects and surveyors, 168, St. Helen's Road, Swansea, on payment of £1 1s. Tenders, sealed and endorsed, are to be delivered at the Vicarage, Christ Church, Swansea, not later than 6 p.m. on June 24.

June 24. Clydach.—*Erection of new Hafod Inn*, Clydach, near Brynmawr, for Messrs. A. Buchan & Co. Plans and specifications can be seen either at the present Hafod Inn, Clydach, or at my office, Clifton Street, Aberdare, where bills of quantities may be obtained on application. Endorsed tenders to be sent in to T. Edwards, Esq., Rhymney, not later than June 24.

June 24. Lowestoft.—*Building of a retort house* and coalyard wall. Specification and drawings may be inspected, and schedule of quantities and form of tender obtained on payment of £2 2s. at the office of the Company, London Road, Lowestoft, and at the office of Messrs. T. & C. Hawksley, civil engineers, 30, great George Street, Westminster Tenders must be delivered to C. E. Allerton, secretary, Gas Office, 137, London Road, Lowestoft, before 10 a.m. on June 24.

June 24. Ton.—*Erection of house* at Maindy Crescent, Ton, for J. P. Williams. Plans and specification may be seen with W. D. Morgan, M.S.A., architect, Post-office Chambers, Pentre. Sealed and endorsed tenders to be delivered to the proprietor on or before noon on June 24.

June 24. Ton Pentre.—*Erection of four houses* at Canning Street (extension), Ton Pentre, for Messrs. Pearce and others. Plans and specification may be seen with W. D. Morgan, M.S.A., architect, Post-office Chambers, Pentre. Sealed and endorsed tenders to be delivered by noon, June 24.

June 25. Bishop's Stortford.—*Repairs to the farm buildings* at their sewage farm, for the U.D.C. Specification of the work required to be done can be seen at the office of the Surveyor to the Council, R. S. Scott, A.M.I.C.E., 7, North Street, Bishop's Stortford, from whom form of tender can also be obtained. Tenders, endorsed "Tender for Repairs to Farm Buildings," to be sent to T. Swatheridge, clerk, Council Offices, 7, North Street, Bishop's Stortford, by 4 p.m. on June 25.

June 25. Easton.—*Erection of five cottages* at Easton, near Portland, Dorsetshire, for the G.W.R. Plans and specifications may be seen and forms of tender and bills of quantities obtained at the office of the Engineer at Bristol Station, between 10 a.m. and 4 p.m. Tenders, addressed to G. K. Mills, secretary, Paddington Station, London, and marked outside "Tender for Cottages at Easton," will be received on or before June 25.

June 25. Gravesend.—*Enlargement of the post-office* at Gravesend. Drawings, specification, and a copy of the conditions and form of contract may be seen on application to the Postmaster at Gravesend. Bills of quantities and forms of tender may be obtained at the undermentioned address on payment of £1 1s. Tenders must be delivered before 12 noon on June 25, addressed to the Secretary, H.M. Office of Works, &c., Storey's Gate, London, S.W., and endorsed "Tender for the Enlargement of Gravesend Post-Office."

June 25. St. Albans.—*Erection of additional works* at their asylum at Hill End, near St. Albans, for the Visiting Committee of the Hertfordshire C.C. Applications for bills of quantities, accompanied by a deposit of £2, to be made to G. T. Hine, F.R.I.B.A., architect of the Committee, 35, Parliament Street, Westminster, on or before June 13. Tenders, addressed to the Clerk to the Committee of Visitors, to be delivered at the Hill End Asylum, near St. Albans, not later than 10 a.m. on June 25.

June 25. Ilford.—*Erection of a public library and hall*, &c., situate at the junction of Kingswood Road and High Road, Seven Kings, Ilford, Essex. Plans, specification, form of tender, and full particulars may be obtained (on payment of a deposit of £5 5s., upon application to H. Shaw, M.Inst.C.E., engineer and surveyor to the Council, at the Town Hall, Ilford, Essex. Sealed tenders, endorsed "Tender for Seven Kings Library and Hall," must be addressed to and received by J. W. Benton, clerk to the Council, Town Hall, Ilford, Essex, on or before 12 noon on June 25.

TOO LATE FOR CLASSIFICATION.

June 21. Manchester.—*Supply of about 85,000 5-in. Karri wood-paving blocks* and about 20,000 4-in. Karri wood-paving blocks. Forms of tender may be obtained on application to the Chief Clerk, Paving, &c., Department, Town Hall, Manchester. Forms of tender may be obtained on application to the Paving, &c., Department (Surveyor's office), and must be returned to the Chief Clerk, Paving, &c. Department, Town Hall, Manchester, before 10 a.m. on June 21.

June 22. Dunbar.—*Erection of a concrete wall* of 175 cub. yds., at St. Anns, Dunbar. Copies of the specification and schedule may be had on payment of £1 1s. from R. White, town clerk, Dunbar, to whom tenders must be sent not later than June 22.

June 22. London, N.W.—*Annual repairs to schoobs.* Applications for copies of specifications must be made to the Education Committee's Architect, G. E. T. Laurence, A.R.I.B.A., 22, Buckingham Street, Adelphi, W.C., on or before June 24. Fair wages clause.

June 24. Dublin.—*Construction of six bridges*, containing in the whole about 540 tons of steelwork, for the Gt. N. Ry. Co. (Ireland):—1, Portadown, double (river), 216ft., three-span; 2, Portadown, treble (street), 45ft., one-span; 3, Scarva, single (canal), 41ft., one-span; 4, Cavan (footbridge), 61ft., one-span; 5, St. Johnston, double (stream), 18ft., one-span; 6, Carrickmore, single (road), 26ft., one-span. Price of copies of plans and specifications from 5s. to £2. Parties wishing to tender may see the drawings and specification at the office of W. H. Mills, engineer-in-chief, Amiens Street, Dublin, or copies of them at the District Engineer's office, Belfast, and can obtain at the said offices lithographed copies of the drawings, specification and forms of tender upon payment of the fees, which are not returnable. Tenders, made out on the forms supplied by the Company, and endorsed "Tender for Bridges," should be delivered to T. Morrison, secretary, Secretary's Office, Amiens Street Terminus, Dublin, not later than 10 a.m. on June 24.

June 24. Aberdare.—*Making roads*, lanes, construction of sewers, surface water drains, and the erection of 43 houses at Gadlys Gardens, Aberdare for the Pen-y-bryn Building Club. Drawings and specifications can be seen at the Gadlys Estate Offices, Aberdare, between 10 a.m. and 4 p.m. Sealed and endorsed tenders are to be sent to J. M. Simpson, secretary, Pen-y-bryn Building Club, Gladlys Estate Offices, Aberdare, on or before June 24.

June 24. Cambridge.—*Painting and redecoration* of Fulbourn Asylum, Cambs. Particulars and quantities may be obtained on deposit of £1 1s. from the Architect to the Asylum, A. P. MacAlister, 20, St. Andrew's Street, Cambridge. Tenders to be delivered by 10 a.m. on June 24.

June 24. Seaforth (Liverpool).—*Erection of sanitary conveniences* at Fort Road, Seaforth. Plans and specification may be seen and bills of quantities obtained on application to F. S. Yates, A.M.I.C.E., surveyor to the U.D.C., at the Town Hall, Waterloo, Liverpool. Deposit 10s. 6d. Sealed tenders, addressed to the Chairman of the Health Committee, and endorsed "Tender for Conveniences," are to be delivered at the Town Hall, Waterloo, Liverpool, not later than 12 noon on June 24.

June 24. Pole Moor (Huddersfield).—*Conversion* of the Old Globe Inn, Pole Moor, into a branch store for the Slaithwaite Equitable Industrial Society, Ltd. Plans may be seen, and bills of quantities obtained from J. Berry, architect and surveyor, 3, Market Place, Huddersfield, to whom tenders, free of charge, must be delivered not later than June 24.

June 25. Edinburgh.—*Painter work* at George Heriot's School and Heriot-Watt College. Specifications and schedules of measurement may be obtained from J. Anderson, superintendent of works. Tenders to be lodged with P. Macnaughton, S.S.C., clerk, 20, York Place, Edinburgh, by June 25.

June 25. Llangennech.—*Erection of a chancel*, organ chamber, and vestry to St. Cennych Church, Llangennech, for the Rev. T. G. Jones. Plans may be seen at the Llangennech Vicarage, and with E. M. B. Vaughan, F.R.I.B.A., architect, Cardiff, where bills of quantities may be obtained on depositing £2 2s. Tenders are to be sent to the Architect not later than 12 noon on June 25.

June 25. Manchester.—*Setting back wall* in Wilmslow Road, Fallowfield. Drawing may be seen and specification, bill of quantities, and form of tender obtained on application at the City Surveyor's office, Town Hall, Manchester, on payment to the City Treasurer of £2 2s. Tenders, enclosed in the official envelope, and addressed to the Chairman of the Improvement, &c., Committee, to be delivered at the City Surveyor's office not later than 10 a.m. on June 25.

June 26. London.—*Delivery of Portland cement* for East Indian Railway, as per specification to be seen at the Company's offices. Tenders are to be sent to C. W. Young, secretary, Nicholas Lane, London, E.C., marked "Tender for Cement," not later than 12 noon on June 26.

June 26. Middlesbrough.—*Supply of sanitary pipes*, timber, plate bricks, common bricks, concrete, flags and kerbs, Portland cement, annealed scoriæ blocks, whinstone and granite setts, broken whinstone and granite, broken slag, manhole covers and frames, gully grates, flushing boxes, &c., required durin gthe ensuing twelve months. Specifications may be seen and quantities obtained on application at the Borough Engineer's office, on payment of 10s. 6d. Sealed tenders, upon the forms supplied, are to be sent to A. Sockett, town clerk, Municipal Buildings, Middlesbrough, not later than 10 a.m. on June 26.

June 27. Radford (Nottingham).—*Erection of additional stables* at their Depôt at Radford, for the Corporation. Drawings may be seen and copy of the specification, bill of quantities, and form of tender may be obtained on applying to A. Brown, M.Inst.C.E., city engineer, Guildhall, Nottingham, on payment of a deposit of £1 1s. Sealed tenders, endorsed "Stables, Radford Health Depôt," are to be delivered to S. G. Johnson, town clerk, Guildhall, Nottingham, on or before June 27. Fair wages clause.

July 1. Leeds.—*Erection of a block of warehouse premises* in Bishopgate Street and Swinegate, Leeds. Names of persons wishing to tender should be sent to T. Winn & Sons, architects, 84, Albion Street, Leeds, on or before July 1, when bills of quantities will be duly forwarded.

No date. Gorleston (Yarmouth).—*Public clock* for Gorleston.

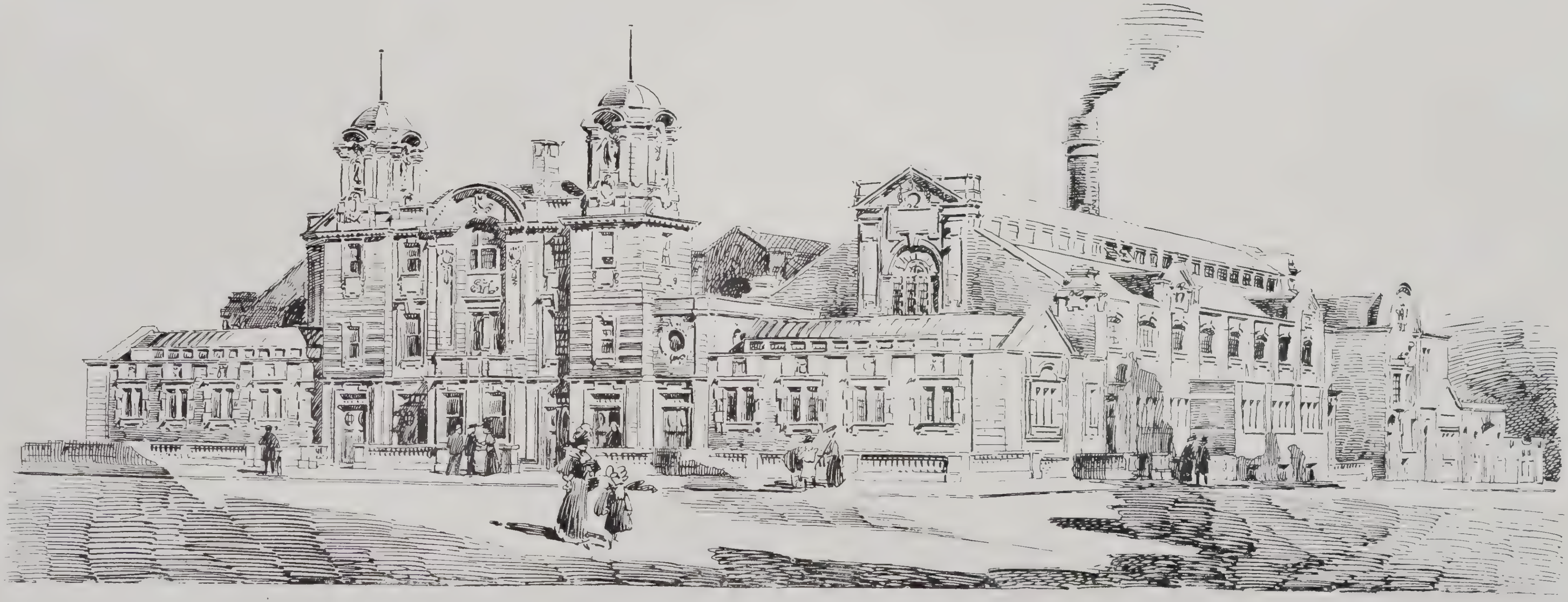
No date. Llandudno.—*Erection of pair of villas* at Llandudno. For plans, &c., apply Mines, 65, South John Street, Liverpool.

No date. Kendal.—*Erection of Carnegie Library* at Kendal (Westmorland). Names of persons wishing to tender should be sent to the Architect, T. F. Pennington, A.R.I.B.A., Tivoli House, Hounslow Heath, London, W.

No date. Gateshead.—*Painting and cleaning* various schools during the summer vacation (July 26—August 26). Specifications and particulars may be had on application to the Education Office, Prince Consort Road, S., Gateshead.

(*Contracts continued on page xxiv.*)

LIBRARY
OF THE
UNIVERSITY OF [illegible]



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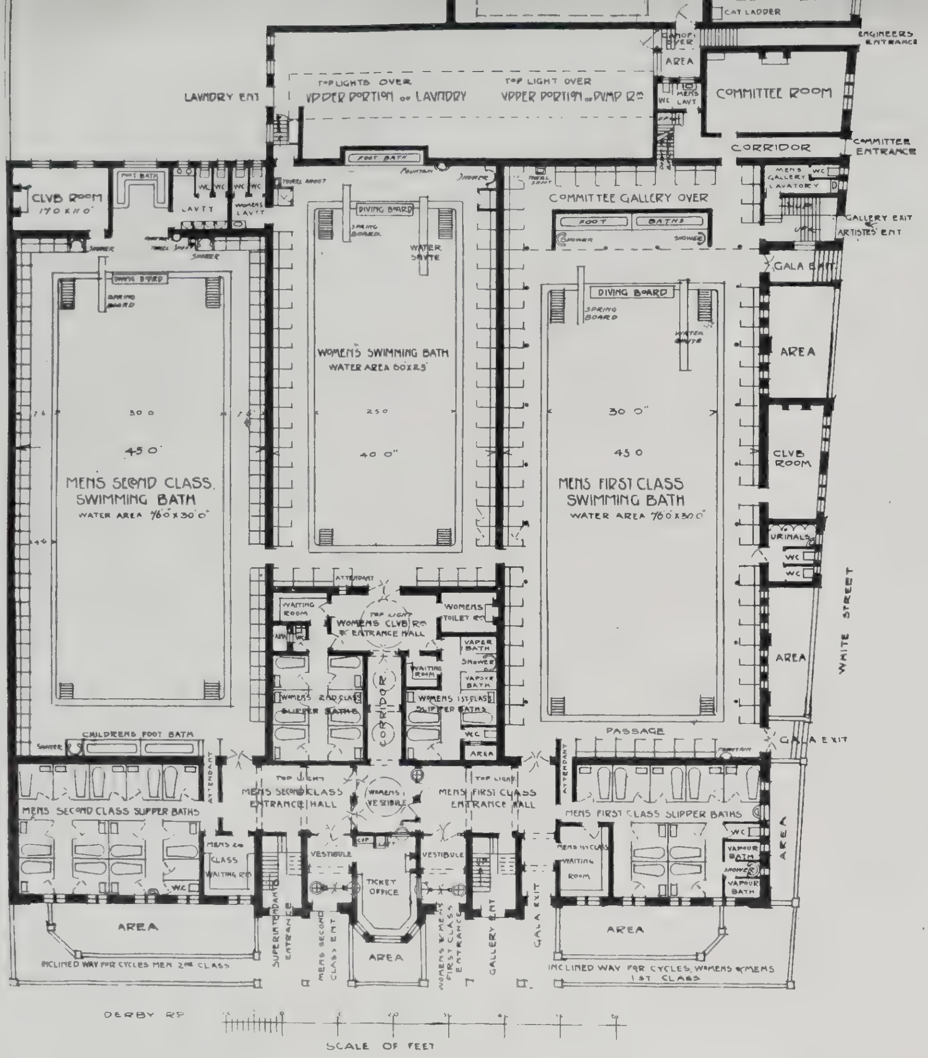
SIZE OF BOILER 30 x 8


LAUNDRY ENT
TOP LIGHTS OVER UPPER PORTION OF LAUNDRY
TOP LIGHT OVER UPPER PORTION OF PUMP RM
COMMITTEE ROOM
CORRIDOR
ENGINEERS ENTRANCE
COMMITTEE ENTRANCE
GALLERY EXIT
ARTISTES' ENT
GALA EXIT
CLUB ROOM 17'0 x 11'0"
FOOT BATH
COMMITTEE GALLERY OVER
DIVING BOARD
SPRING BOARD
WATER SHUTE
WOMEN'S SWIMMING BATH
WATER AREA 60 x 25'
MENS SECOND CLASS SWIMMING BATH
WATER AREA 76'0 x 30'0"
MENS FIRST CLASS SWIMMING BATH
WATER AREA 76'0 x 30'0"
AREA
CLUB ROOM
URINALS
WC
WHITE STREET
CHILDRENS FOOT BATH
PASSAGE
WAITING ROOM
WOMENS CLUB RM & ENTRANCE HALL
WOMENS TOILET RM
VAPOUR BATH
SHOWER
WOMENS 2ND CLASS SLIPPER BATHS
WOMENS 1ST CLASS SLIPPER BATHS
CORRIDOR
MENS SECOND CLASS SLIPPER BATHS
MENS SECOND CLASS ENTRANCE HALL
WOMENS VESTIBULE
MENS FIRST CLASS ENTRANCE HALL
MENS FIRST CLASS SLIPPER BATHS
MENS 2ND CLASS WAITING RM
VESTIBULE
TICKET OFFICE
MENS 1ST CLASS WAITING ROOM
SUPERINTENDANTS ENTRANCE
MENS SECOND CLASS ENT
WOMENS & MENS FIRST CLASS ENTRANCE
GALLERY ENT
INCLINED WAY FOR CYCLES MEN 2ND CLASS
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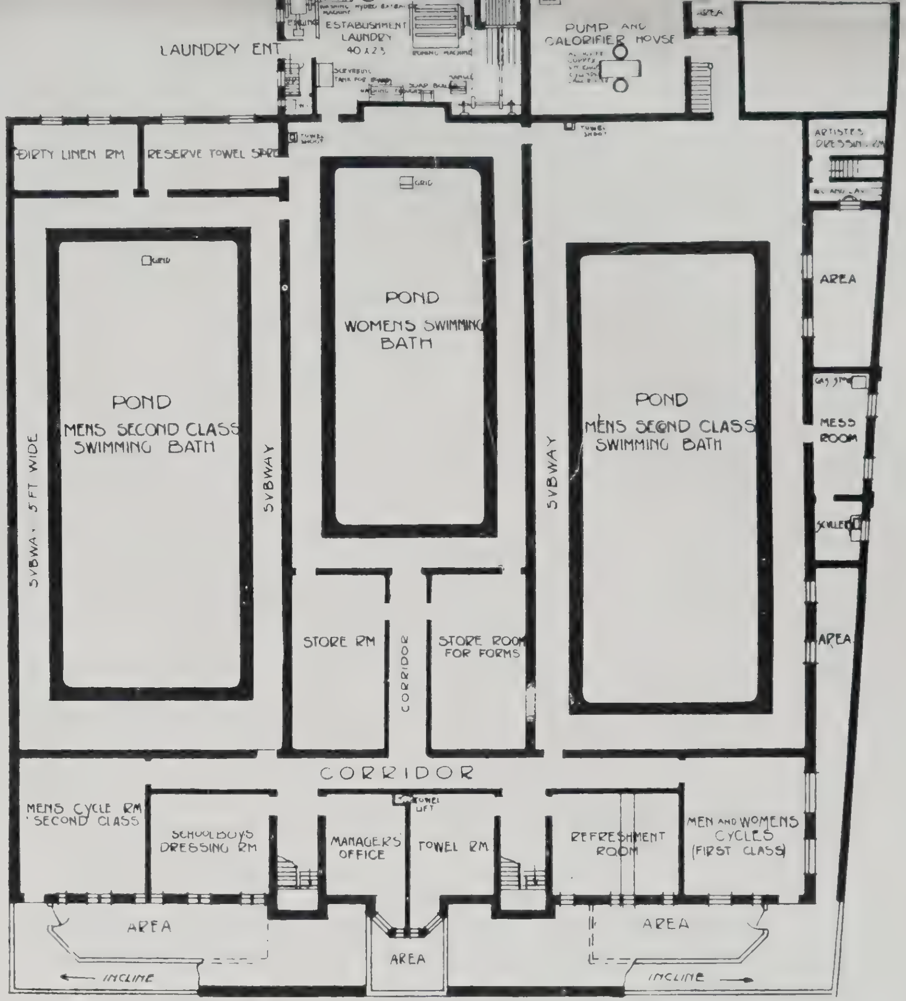
DERBY RD
SCALE OF FEET

Ground-Floor Plan.



Basement Plan.

PROPOSED NEW BATHS, DERBY ROAD, WEASTE, MANCHESTER: DESIGN PLACED FIRST. MANGNALL AND LITTLEWOODS, ARCHITECTS.

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June 26, 1907. Volume 25, No. 646

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

Notices.

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The Contractors' Supplement is given in this issue.

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Stucco. Is there a reaction against the universal use of red brick in modern building? We ask the question, but are not prepared to answer it, though some signs of change are visible here and there; a new structure faced entirely with finely-worked white stone is less unusual now than it was a few years ago, and this does not stand alone—rubble, for instance, being in considerable favour. It may not be out of place, then, to revert to one of the many materials that have figured in English building down to the period when red brick was revived—for its use is a revival—and became for a while omnipotent—namely, stucco. Without going too much into detail it may be classed with plaster, and its use goes back a long way. For interiors it became popular under the Tudors, who invited the "Stuccatori," Italian workers in plaster, to make elaborate plaster ceilings, friezes, and "pendants"; in exteriors we find it in "pargetting" work, usually in grotesque designs filling up gables and frontispieces, or in external panelling. As the Renaissance in England grew more severe and classical this form of ornamentation disappeared from London, though lingering a little in the provinces; brick was the building material of the eighteenth century, but towards its close Robert Adam and his sons used a peculiar kind of stucco to front their modified Classic designs; it was well suited apparently to their shallow pilasters and thin though graceful details. But it was the great increase of London in the nineteenth century that for a time made "stucco"—the word is somewhat loosely used—nearly universal; unfortunately it was applied to designs made by the mile, and became so synonymous with monotony that it produced a violent reaction in favour of red brick. For a time it was banished from building; it became a name of reproach and denoted sham and make-believe, but the material was really made responsible for the faults of design, and it may be well to recall some instances of its successful application. We allude here to stucco pure and simple, not painted stucco, though the latter is sometimes admissible. The United Service Club has recently been refaced with stucco, and the delicate grey surface is extremely effective. Across the road its opposite neighbour, the Athenæum, is painted, and the surface, simply as such, is not so effective. Both buildings are of fine Palladian design, the latter being the masterpiece of Decimus Burton. A curious example of stucco is the Garrick Club. Here, again, a fine, bold, but very simple design renders the spectator somewhat indifferent to the material, which is stucco, not, however, painted, nor of light grey, but dark—so dark as to be nearly black in the shade, especially under the strongly-marked cornice. Several squares and a few other buildings were similarly treated, the idea evidently being that London atmosphere in time reduces all surfaces to "smoke colour," so why not start with it? But the building, in spite of its dark surface, is in no sense gloomy.

The Need for Small Inventions. THERE is not enough invention displayed in the improvement and extension of the tools and appliances used in both architecture and building. Inventors are not encouraged, we know, to study the smaller things of life, for the remuneration awarded is incommensurate as a rule with the time, trouble and money involved. Our English Patent Office has also been blamed, and perhaps with some justice, but it is the public which is chiefly at fault. It is a pity that the reward should not be greater for the perfector of tools and appliances, because it is in the processes where they are necessary that economy could so often be obtained. How often do we see manufacturing processes lagging behind, obviously effete and out-of-date, simply because invention has never stepped in, or conservatism has ever refused the inventor encouragement. Take, for instance, draughting methods and drawing instruments. The waste of time and inaccuracies and mistakes constantly arising from imperfect appliances in everyday use are ever with us, but the architect or the engineer seldom troubles to consider whether he can save himself all this, by the expenditure of a small sum and a little study. There are excellent little inventions placed on the market from time to time which never get tried, and there are many openings for improved appliances. The same applies to surveying and scientific instruments, and to tools in the various crafts. Year after year we go on in much the same way, wasting time and labour because we do not use our heads, or support those who think for us. Again, how often do we see new methods of construction and new materials welcomed because they save a fraction of money upon older methods, yet neither their inventors nor the public realise that by improving the means of manufacture much greater economies could be secured from the older, and still more from the newer, methods.

THE COMPETITION "GHOST."

By X.

The architect's "ghost" has so frequently made his appearance amongst those concerned with architectural competitions, and with material advantages to those who may have called him forth, that some particulars respecting him may be of interest.

Although, as a rule, the architect who employs "ghosts" is perhaps more despised than the employed, yet, to the writer's personal knowledge, many of the most esteemed leading architects have had resort to such aids when preparing their competitive or other schemes for buildings out of their usual class of practice: such as municipal offices, police-stations, hospitals, workhouses, asylums, public baths, theatres, and music-halls; designs for which may have been required from an architect whose experience has been in other directions.

But cases have occurred where architects fully experienced in certain classes of design and planning have been anxious to obtain the ideas of other specialists, but without disclosing the names of those supplying the same; in some instances the aid may be required by reason of pressure of business.

The "ghost," however, has very frequently been employed by the county, municipal, district, or other surveyor, who may have been charged with the duty of preparing designs for public buildings without possessing a sufficient knowledge of the nature of the work required, and who may thus deprive qualified architects residing within his district (ratepayers contributing to his salary) of business to which they may have some claim. (This work, supplied by a public surveyor, but done by the "ghost," becomes a reason for an increase in the official's stipend, to which, of course, the neglected architects contribute also their proportion as ratepayers.)

In the case of competitions the remuneration of the "ghost" often takes the form of a salary to be agreed upon, together with a bonus in the event of success; or if the competitor be placed first, the first premium may be given, after which the "ghost" has no further claim, neither does he obtain any published credit in respect of his successful efforts.

Occasionally, the whole of the work of the "ghost" may be done at his own residence or offices; such was the case in connection with an enormous public building, in reference to which the following agreement was signed by a certain very eminent firm of architects, and a specialist employed by them :—

> Memorandum of Agreement made this ...... day of ...., between .... of the one part and .... of the other part. The said .... doth hereby agree to prepare the whole of the plans and drawings required and in accordance with the published instructions to architects, for the competition for the new .... at ...., and undertakes to deliver the same at least one week before the ...... day of .... next, or at least one week before any later day that may be arranged for by the promoters of this competition; together with a full draft report and estimate of the cost, and will perform the work to the best of his ability and in accordance with all the requirements as far as may be possible. And the said .... do hereby agree to pay to the said .... in respect of the above services the sum of one hundred pounds in manner following, that is to say, the sum of ten pounds on the commencement of the work, the sum of forty pounds when the sketch plans are delivered, and the balance of fifty pounds when the finished plans are delivered, ready for mounting, &c., by the said ....
>
> Should the said .... be appointed architects to carry out the works herein referred to, or any considerable part thereof, they agree to pay the said .... the further sum of two hundred pounds upon receiving the first instalment of commission.
>
> Signed by the said parties hereto, the day and year first above written. } ....

The employers in the above agreement stood to obtain a commission which, at five per cent., would amount to £10,000, while the "ghost," in the most favourable circumstances, would not get more than £300, although he practically did all that was necessary in obtaining the work.

How the "Ghost" Obtains Employment.

In what manner does the "ghost" obtain his employment? In some cases he notes that there is to be a competition of architects for schemes for some public building, the special details of which are familiar to him, and he forthwith writes a private letter to those local and other architects who may appear likely to enter upon a little speculation, offering his services upon "speculative terms," though not usually stating what those terms may be in the first instance; occasionally, however, demands for such assistance are the later results of replies to advertisements in the professional journals.

An architect, now deceased, kept in his London office a couple of young assistants who inked in, coloured, and finished a large number of competitive drawings which were supplied and finished ready in pencil by a "ghost," who also prepared the report and estimates; the architect who employed him was a thoroughly competent man for architectural work of certain descriptions, but found it necessary to employ someone to make the design for buildings, the details of which were not familiar to him; but it is only fair to state that he paid the "ghost" very handsomely for schemes that would have cost, probably, not less than £800,000 to carry out.

Occasionally, a thoroughly incompetent architect is desirous of winning a competition, and has paid a specialist to come into his offices for the purpose. A case occurred some years ago of such a man whose only part in the work was the mounting of the plans on the stretchers; he was the architect of a set of chambers, and the only tenant of the building, which was a standing warning to his fellow townsmen *not* to employ him; but he won the competition by the efforts of the specialist he had selected! Thus some have greatness thrust upon them!

On occasions the "ghost" has supplied designs for more than one architect in the same competition, in this way gaining an increased possibility of obtaining a bonus, in addition to the extra salary, but this would not frequently occur, and the strain upon the "ghost" in making two schemes for the same building, within a limited space of time, would be considerable, especially where it was desirable that the two designs should be unlike in all respects.

The "ghost" may be perhaps an architect with a small practice who is a good draughtsman and designer, and it often happens that his services are valued rather in respect of the planning, arrangements, and construction of a building than for the elevational portions, but his aid in reference to the report and estimates are often desired, especially in those cases where the complicated questions arise as to the warming, ventilation, sanitation, engineering, artificial lighting, &c., of a very extensive series of buildings connected with a workhouse, asylum, hospital, or other establishment intended for the housing of large numbers of various classes of inmates.

Or the "ghost" may be an architect's assistant out of employment who cannot afford the risk and expenses connected with a competition, and who is only too glad of the temporary work, especially when there is a prospect of further remuneration or employment in the event of success.

A Clause in Conditions.

During recent years many architectural competitions have had, amongst their conditions, a clause prohibiting the employment of any assistant not a member of the competitor's ordinary staff, but unless a stipulation be added to the effect that all assistants employed must have been in such employment for a term named, the clause could easily be evaded; nevertheless, special assistance is often fairly required, for many details in connection with exceptional building plans, and particularly in reference to certain engineering and sanitary arrangements, are out of the range of an ordinary architect's practice; heating and ventilation and laundry appliances, as connected with very large buildings, have so frequently been unsatisfactory when contrived by architects not having the required previous experience of such works, that the employment of persons well acquainted with these subjects becomes obviously necessary and desirable.

The Direful Effect of Local Influence.

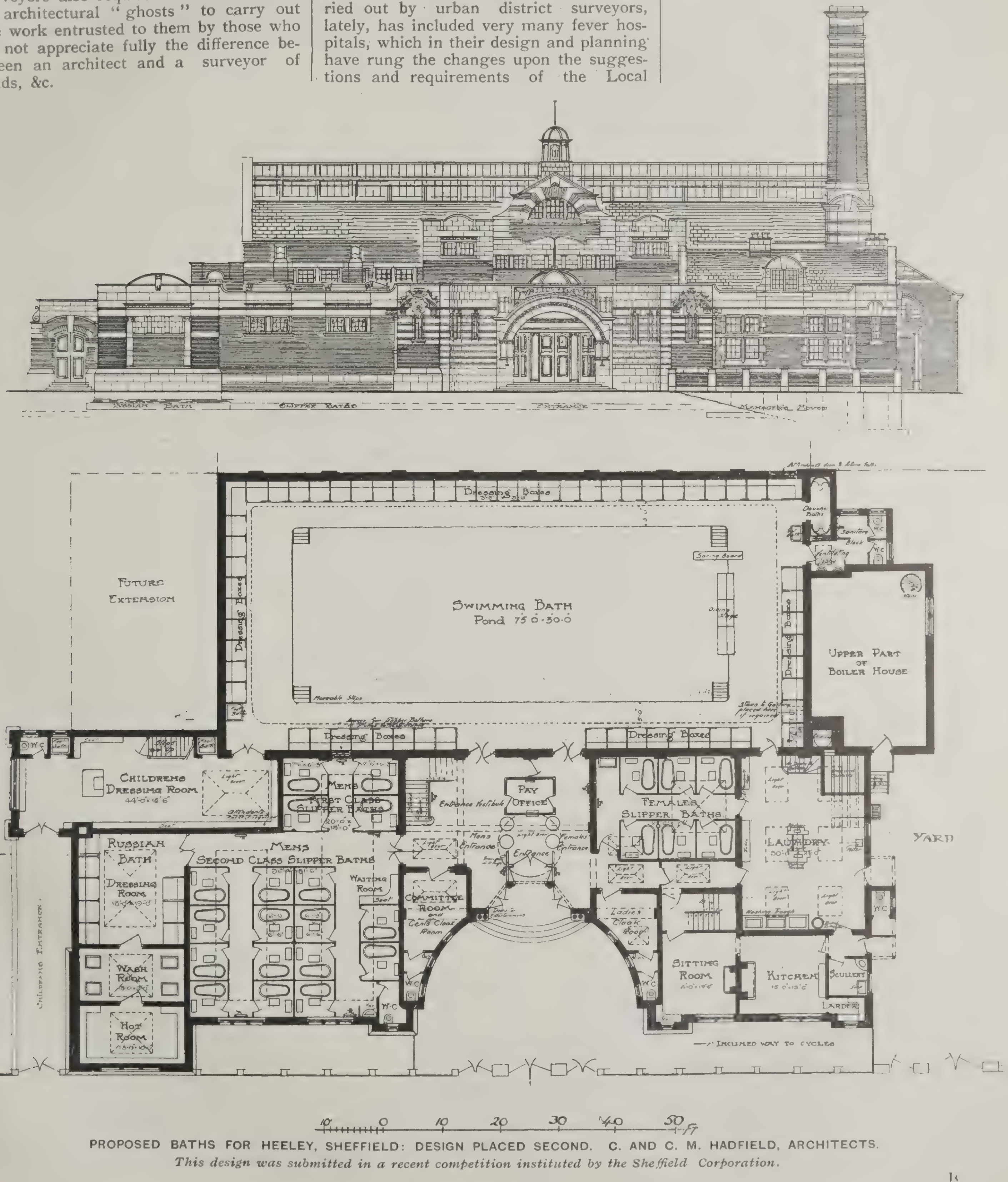
Long before a competition was advertised local influence has frequently settled that a local architect should have the commission, all that has been necessary being a scheme that would pass muster; hence the appointment of a "ghost" assistant. The selection of his design, however, has not been the only advantage to the architect. The writer recollects a certain case where a competing architect, not getting back his unsuccessful designs, called at the offices of the local surveyor, where, and to his very great astonishment, he saw his plans under the process of being traced: he acted very promptly by tearing off the tracings, and, rolling up his drawings, departed, after expressing his opinions very freely.

In such instances as the above there have been deliberate attempts to steal the designs made by an architect, who may, for local reasons alone, have been unsuccessful; yet, as the designs of all the competitors are exposed to view, the unsuccessful architects may all be utilised as unpaid "ghosts"; in fact, there have been numerous instances where unselected designs have influenced very considerably the planning and appearance of the buildings as erected.

Surveyors' Ghosts.

The "ghost," when employed by the county surveyor, has been engaged upon such county work as asylums, police stations, public offices, &c., as the latter, being usually more of a surveyor than an architect, has badly required such assistance, and it is not in every county that the circumstances require that a sufficient architectural staff shall be constantly employed, although the county surveyor's duties are supposed to include some architectural practice; in some cases, however, the county surveyor has been an architect, and even allowed private practice, but the present tendency is rather to prohibit such private work, and to require that the official shall devote the whole of his time to his public duties. In like manner municipal surveyors are often charged with architectural duties at times, including the designs for municipal buildings, hospitals, baths, cemetery chapels, &c., while the urban and rural district surveyors also require the occasional aid of architectural "ghosts" to carry out the work entrusted to them by those who do not appreciate fully the difference between an architect and a surveyor of roads, &c.

Of late years quite a large amount of architectural work has been carried out by urban and rural district surveyors, amongst whom very few could be considered as well-trained architects; "ghosts" in such cases have become absolutely necessary, either in the form of qualified assistants engaged temporarily for the work in hand, or otherwise as architects in private practice who do not, or cannot, let their names appear, but are paid by the surveyor a very moderate sum, the official not infrequently looking forward to a rise of salary as his remuneration in respect for work that he could not have undertaken but for the "ghost." The architectural work carried out by urban district surveyors, lately, has included very many fever hospitals, which in their design and planning have rung the changes upon the suggestions and requirements of the Local Government Board for twenty years back; if there be one class of building more than another that requires the work of an architect rather than of a surveyor of roads, it is that in which fever patients have to be housed and separated from the healthy population, yet such work is too frequently passed over to surveyors who, even with the aid of the local medical officer of health, are unable to plan so well as an ordinary architect; and it is often wrongly supposed that a fever hospital is a very easy building to plan, and merely a matter of repetition of existing models, quite oblivious to the fact that every new site presents some fresh problem.



PROPOSED BATHS FOR HEELEY, SHEFFIELD: DESIGN PLACED SECOND. C. AND C. M. HADFIELD, ARCHITECTS.

This design was submitted in a recent competition instituted by the Sheffield Corporation.

In spite of all that has been done towards putting down the "ghost" system, the Royal Institute of British Architects would be surprised to know the names of some of the Fellows and Associates who have taken either the part of "ghosts" or as employers of them, the latter including some of the most respected and best architects of the past quarter of a century.

A very well-known firm of architects, in Lancashire, employed occasionally a very able architect as their "ghost"; although he was very steady and reliable, yet it was found necessary (with his consent) to lock him up in an office while he was working, with only the plans and papers relating to the work in hand accessible to him, as he had a bad habit of turning to other subjects, and a great difficulty in concentrating his attention; probably had it not been for this failing he would have been in more successful practice on his own account; several works on construction were written and published by him, and are of high value, but his habits and nature fitted him only for employment under architects with business habits; he gained some notable successes as a "ghost" in the employment of those who had the advantage of recognising his great ability.

Correspondence.

Curved Struts in Medieval Roofs.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—In reference to the reply about the above in "Enquiries Answered" recently, may I suggest that many of these curved struts in old roofs and framings once formed the ribs to the old wooden ships. I have no doubt that the old ships when worn out were broken up, and the timber sold for further use, such as struts, rafters, joists, etc. I have pulled down many old buildings, and have nearly always found that the timbers had been used before being fixed in the existing buildings.—Yours truly,

C. H. D.

ALTON, HANTS.

Removal of Surface Water.

To the Editor of THE BUILDERS' JOURNAL.

SIR,—Referring to the enquiry about removal of surface water on p. 278 of your issue for June 5th, you do not quote the case of *Matthews v. Strachan* (2 K. B. 540), reported in your columns during June, 1901, in which case the justices held that the district council had no power under the Public Health Act, 1875, to compel the construction of a separate drain for surface water, because it was, in effect, asking the owner of the house in question to subscribe to a general system of drainage, whereas the Act only specifies size, material, level, and fall of drains. One would think, therefore, that the public authority could not have power to enlarge the Act by making by-laws for other objects, even under section 157, beyond that given in section 25. Macmorran, K.C., however, quotes Mr. Justice Ridley as saying such a matter might be provided for by by-laws under section 157.—Yours truly,

T. WICKFORD POTTER.

PRESCOT.

Notes on Competitions

A new London County Hall.

A feeling of uncertainty prevails about the new County Hall for London. The question of the conditions is no longer to the front—it was foolish indeed to raise any discussion about them after they had once been issued and adopted. The present uncertainty is of much greater consequence, being no less than a doubt as to whether the essentials of the scheme will be carried out by the municipal reform party. We believe that the conditions of the competition provide for a large central hall in the building, and there is talk that this should be cut down. Of course, if such a change were made at this time of day the competition would be rendered half futile, because the probability is that competitors are making this hall the centre of their planning. It is to be hoped, therefore, that no radical alteration will be made in the scheme. We see the Establishment Committee proposes that one of the galleries of the London University should be hired for 28 days for the exhibition of designs, which have to be sent in by August 27th.

Temperance Hotel, Horley.

Out of fourteen designs for a temperance hotel and cyclist rest at Horley submitted in competition, the design of Mr. W. I. Chambers, 7, John Street, Adelphi, W.C., has been selected and will be immediately proceeded with. The design placed second in order of merit was submitted by Mr. D. I. Barry, of Reigate. The promoter of the competition kindly sent all unsuccessful competitors a small sum in recognition of the trouble to which they had been put. The site of the proposed building is an admirable one for the purpose. It is V-shaped, at the junction of two roads, the point of the V facing up the main turnpike road to Brighton. The building will be placed across the site, so as to face up the road and will be seen for a long distance. We are informed that this makes the 35th competition won by Mr. Chambers out of 42 attempts, dating as far back as 1872, when he won the competition for a new masonic and town hall for Haverfordwest.

Carnegie Library, Wednesbury.

Mr. E. Guy Dawber, F.R.I.B.A., the assessor in this competition, has awarded the first premium (£50) to Messrs. Crouch, Butler and Savage; the second premium (£30) to Mr. Edwin F. Reynolds; and the third premium (£20) to Mr. J. H. Vernon Cale—all of Birmingham.

New Infirmary, Edmonton.

As announced in our issue for last week, Mr. Rowland Plumbe, the assessor, has placed first the design of Mr. Stuart Hill, of London, E.C. The following is a list of the competitors with the estimated cost of their designs:—

Competitor.	Beds.	Architect's Estimate.	Quantity Surveyor's Estimate.
Stuart Hill	812	£152,640	£144,000
W. A. Pite	796	188,000	163,000
A. E. Pridmore ...	812	166,000	180,000
Marcus Collins	802	196,000	186,000
W. H. Ward	804	149,000	214,000

A Sanatorium Competition.

The following is a summary of the particulars issued by the County of Cork Joint Hospital Board in regard to the competition for the sanatorium for consumptives proposed to be erected at Streamhill, Doneraile:—

The building is to accommodate 70 patients and to be capable of expansion if necessary. Provision is to be made for the staff which, in the opinion of the competitor, is required for an institution of this size—namely, doctors, nurses, servants, &c. The plans sent in must be sufficient for contract purposes. There is no specified sum to be spent on the buildings, but efficiency with economy will be taken into account in the selection. The style of building, drawings, &c., are optional. The engineering and medical inspectors of the Local Government Board have been asked to officiate as assessors. "If they do not consent to act, some architect who is not a competitor will probably be appointed, and the selected plan, if any, will be afterwards submitted to the Local Government Board for their approval." The Engineer to the Joint Board, Mr. R. Evans, 53, South Mall, Cork, will carry out the work of construction. The block system of building is to be adopted. A steam laundry is to be included in the plans, and provision is to be made for a disinfector. Sewage is to be disposed of on the ground. The water supply is to be taken from the Buttevant main. Water is not to be used for power purposes, but arrangements are to be made so that in case a turbine should afterwards be used as an auxiliary it can easily be connected with the machinery. The surface is loam for a depth of about 2ft. Sand costs 4s. per ton delivered on the site. There are good limestone quarries less than a mile distant. There is no gravel available.

An Essay Competition.

In connection with the architectural department of St. David's College, Lampeter, a prize of £10 is offered, open to anyone in Holy Orders, for the best essay on "the architectural and historical features of *not more than two* churches" in the district in which he may be working. Essays must be sent in not later than October 1st next to the Principal of St. David's College, Lampeter, from whom particulars can be obtained. The judges will be the Rev. Professor Green, superintendent of the architectural department of St. David's College, and Mr. W. D. Caroë, F.S.A., architect to the Ecclesiastical Commissioners.

LIST OF COMPETITIONS OPEN.

Deposit for conditions given where known.

DATE OF DELIVERY	COMPETITION.
July 1	Y.M.C.A. BUILDING AT PONTYPRIDD.—Premiums £25, £10 and £5. Particulars from G. W. Rankin, Bronheulog, Church Place, Penarth. Summary in "Builders' Journal," May 22nd.
July 1	HOUSES FOR THE VERY POOR, KINGSTOWN.—Premiums of £100 and £20. Conditions (1s. each set) from M. A. Manning, town clerk, Town Hall, Kingstown. Summary in "Builders' Journal," May 22nd.
July 2	CARNEGIE LIBRARY AT KILKENNY.—To cost £1,800. "Design, specification, and bill of quantities." Particulars from E. O'Connell, Town Clerk, City Hall, Kilkenny.
July 6	ZION INSTITUTIONAL CHURCH, MANCHESTER.—Limited to Manchester architects. Particulars from J. S, Gibson, 5, Old Bond Street, London, W.
July 20	SANATORIUM AT CORK (for 70 patients). Premium of £100. Particulars (price 10s.) from E. J. Murphy, secretary to Co. Cork Joint Hospital Board, Court House, Cork.
July 30	PIER PAVILION AT WEYMOUTH.—Premium 100 guineas. Particulars from H. A. Huxtable, town clerk, Municipal Offices, Weymouth. Summary in "Builders' Journal," May 22nd.
Aug. 27	LONDON COUNTY HALL.—To cost £850,000. Preliminary designs by this date. Particulars from the Architect, L.C.C., Spring Gardens, S.W. Deposit £3 3s., returnable, if conditions sent back within a fortnight, in the event of the architect deciding not to compete.
Sept. 2	QUAY AND WHARF at new freight harbour, Sannegardsviken, Gothenburg, Sweden.—Conditions from Göteborgs Stads, Byggnadskontor, Marten Krakowkatan No. 5, Gothenburg. Deposit 10 kroner (about 11s.).
Sept. 2	NEW MUNICIPAL OFFICES, &c., AT BETHNAL GREEN. — Premiums of £100 and £50. Conditions from E. E. Finch, Borough Engineer, Town Hall, Church Row, Bethnal Green, London, N.E. Deposit, Two guineas. Summary in "Builders' Journal," May 1st.
No date	ELEMENTARY SCHOOL AT STOCKTON HEATH for 500 children. Conditions from G. F. Ashton, Clerk to Education Committee, 71, High Street, Runcorn. Deposit £2 2s.
No date	SECONDARY SCHOOL AT SOWERBY BRIDGE. — (Limited to architects in West Riding of Yorkshire.) Particulars from R. W. Evans, Clerk to the Governors, Commercial Bank Chambers, Halifax.

R.I.B.A.

Presentation of the Royal Gold Medal to Mr. Belcher.

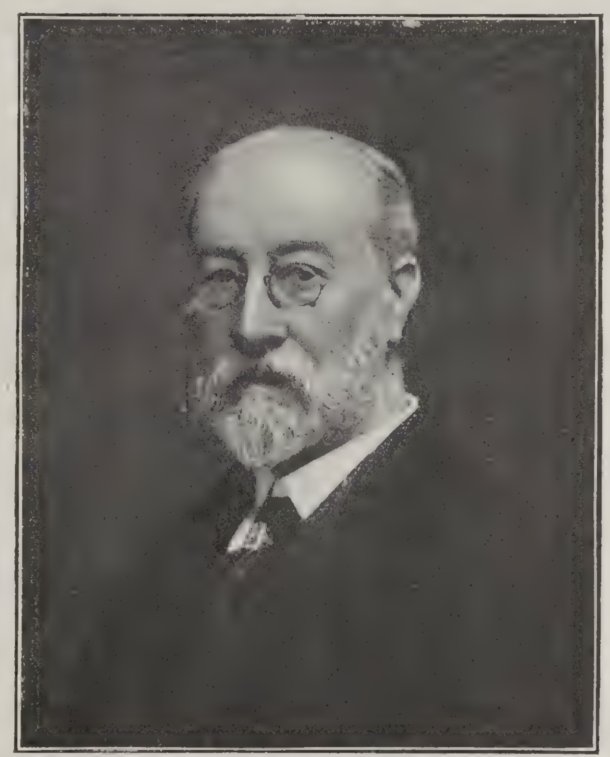
Amid loud applause and cries of "Bravo!" the Royal Gold Medal for 1907 was presented to Mr. John Belcher, A.R.A., at a meeting of the Royal Institute of British Architects held on Monday evening at 9, Conduit Street, W.

Mr. Collcutt, the president, said the Medal had been instituted by Queen Victoria for the promotion of architecture, and he ventured to say that it had never been more worthily bestowed than upon Mr. Belcher, who, by his buildings and published works, had achieved so great a distinction. Articled to his father, Mr. Belcher brought to the beginning of his career the knowledge he had gained as a boy in Paris, where he had been sent to study and sketch, with parental instructions to pay special attention to the Renaissance, as understood in France. For some years after he worked in partnership with his father, but when the latter retired, Mr. Belcher, "after swallowing Street's Academy lectures, forthwith proceeded on a wild Gothic career." He appeared, however, to have soon discovered that his real inclinations lay in another direction. It soon became evident that his feeling and taste found their true expression in the English Renaissance. Among his chief works were the extensive alterations and additions for the Earl of Eldon at Stowell Park; the building of the Institute of Chartered Accountants; Colchester Town Hall; houses on Chiswick Mall; "Holcombe" (Chatham); "Bearroc" (Berkshire); Electra House; Winchester House; Cornbury Park (Oxon), and the Lancaster War Memorial. Of these, the great building in Moorgate Street—Electra House—and the Institute of Chartered Accountants were best known, the former broad, imposing, and masculine in treatment, while exhibiting great beauty and delicacy of detail; the latter treated with much originality, and showing a most judicious use of sculpture and painting. Mr. Belcher, too, had won deserved recognition by the valuable literary services he had rendered to architecture: in collaboration with Mr. Mervyn Macartney he published the most exhaustive volumes on English Renaissance, while his most recent book, "Essentials in Architecture," was warmly welcomed.

Mr. Belcher, responding, said he had always aspired to do good work, particularly work embracing the sister arts of sculpture and painting, and if he had achieved success in this respect he generously acknowledged his indebtedness to his association with so many great sculptors, such as Mr. Thorneycroft, Mr. Harry Bates, Mr. Frampton, Mr. Goscombe John, Mr. Drury, Mr. Pomeroy, Mr. Bertram Mackennal, and others. But he had also been most fortunate in the men associated with him in the carrying out of his work. Earliest of his friends was Mr. James Walter James; then came Mr. (now Professor) Beresford Pite, Professor Harry Wilson, Professor Reilly, Mr. Needham Wilson, Mr. Phillips Figgis, Mr. Corlette, Mr. Fulton, Mr. Cook, Mr. James Scott, Mr. Balfour Paul, Mr. Lionel Detmar, Mr. Curtis Green, Mr. Ibberson, Mr. George Malcolm, and others; and there was now his present staff, every member of which he appreciated; and last of all, a host in himself, his trusty friend and partner, Mr. J. J. Joass. Mr. Belcher also acknowledged his indebtedness to his quantity surveyor, Mr. Gleed, to his builders—Messrs. Colls & Sons especially—and to the innumerable individual workers, craftsmen and others whose skill had been so faithfully employed in his service—in particular Mr. Brindley.

REINFORCED CONCRETE.

The report of the Joint Committee on Reinforced Concrete appointed by the Royal Institute of British Architects has now been published. In the final revision by the Committee a few alterations have been made, which we record in order that readers may be able to correct the provisional report and addenda published in our issue for May 29th last.



JOHN BELCHER, A.R.A,
(Royal Gold Medallist, 1907.)

In clause (b) relating to calculations for "Beams of **T** section with single reinforcement," the final form of the equation for k should be

$$k=\sqrt{\left(\frac{2A_tm}{b_1d}+\frac{A_t^2m^2}{b_1^2d^2}\right)}-\frac{A_tm}{b_1d},$$

the difference being that in the denominator of the second term d^2 takes the place of d_1^2.

In clause (b) relating to calculations for "Columns eccentrically loaded," in the third paragraph the equation for the section modulus should be

$$z=2nAh.$$

It was formerly given as

$$z=\tfrac{1}{2}nAh.$$

In "Case III" of the same clause the equation for the section modulus should be

$$z=\tfrac{1}{8}A_ch+\tfrac{1}{4}(m-1)a\frac{h_t^2}{h}.$$

It was formerly given as

$$z=\tfrac{1}{8}A_ch+\tfrac{1}{16}(m-1)a\frac{h_t^2}{h}.$$

A fifth appendix dealing with "Examples of the method of calculation," by Mr. William Dunn, has been added.

IN PARLIAMENT.

(From Our Press Gallery Representative.)

Electricity Generating Station in Westminster.

One of the most important statements made by the First Commissioner of Works in the recent proceedings of Parliament was in answer to a question by Mr. Cleland, who asked what steps would be taken to secure that the new electricity generating station near the Houses of Parliament and the British Art Gallery should be constructed and worked so as to obviate injury to the fabrics of these public buildings, the art treasures therein, and the vegetation in the Victoria Tower Gardens which were about to be extended at great cost close up to the new station site.

Mr. Harcourt's answer was in the following terms:—

"I shall do my utmost to obtain the insertion of protective provisions at a later stage of the Bill now before this House. With the opinions of Prof. Church and Dr. Thorpe before me, and the knowledge lately acquired of what is happening elsewhere, I take a most serious view of the national risk which is being incurred in this matter, unless precautions are adopted, according to my recommendations, to protect the Houses of Parliament, the adjoining grounds, and the British Art Gallery. I hope I shall have public support in my action."

The Victoria Memorial.

Mr. Harcourt informed Mr. Samuel Roberts that the sculpture in connection with the memorial to Queen Victoria was progressing satisfactorily. As the work was not in his department he was unable to give any definite information as to the date of completion.

Mr. Ward wished to know whether the stone for the memorial was being prepared by foreign workmen.

Mr. Harcourt said the work was not under the charge of any Government department, but was carried out by the Committee appointed to dispose of the fund which was raised by national subscription. He understood that marble, which was being quarried for the purpose at Carrara, was being prepared by the workmen on the spot before it was shipped to England.

The Rameshvaram Temple.

Mr. Rees asked the Secretary of State for India whether the Dharmakarta of the Rameshvaram temple proposed to destroy that edifice and to build up another in its place; and, if so, whether the Madras Government would take any action, direct or indirect, in order to prevent such destruction.

Mr. Morley: "I understand that the manager of the temple has been entrusted by his co-religionists with subscriptions to a very large amount for the repair and restoration of the temple, and that the project which has been approved of provides for the renovation of the wall of the outermost court and the complete rebuilding of the two inner courts. The Madras Government has tendered advice to the manager, but it is not in a position to interfere in the matter against the wishes of temple authorities."

Enquiries Answered.

The querist's name and address must always be given, not necessarily for publication.

The services of a large staff of experts are at the disposal of readers who require information on architectural, constructional or legal matters.

Correspondents are particularly requested to be as brief as possible.

Buildings to Measure near Bridgwater, Bewdley and Grantham.

BRIDGWATER.—A. B. writes: "Please give particulars of buildings in the immediate neighbourhood of Bridgwater, Somerset, suitable to measure for testimonies of study for the R.I.B.A. Intermediate Examination."

The church of St. Mary Magdalene at Bridgwater, although ancient, is not very interesting architecturally. The greater part of it appears to have been rebuilt about 1420, but some of the windows of the nave and the north porch are earlier, dating probably between 1337 and 1377. The north porch is a fine specimen of the Geometrical style. Weston Zoyland has a church with a fine Perpendicular tower. Chedzoy Church contains some fine bench ends of Queen Mary's time. Middlezoy has a Decorated chancel with good windows, a Perpendicular rood screen, and a pulpit dating 1606. Durleigh Church contains some Norman work. At Spaxton Church some fine carved bench ends and a curious alms-chest are to be seen. There is also a fine 14th-century canopied cross containing the Holy Rood and other sculpture. Some good Perpendicular work is to be seen at Cannington Church. The chapel of Enmore Castle has a Norman doorway and an Early English chancel. The pinnacled stair turret also deserves notice.

H. Y. M.

GLASGOW.—S. V. R. writes: "Kindly state what buildings are worth studying in the vicinity of Bewdley, Worcestershire, say within a radius of 10 or 12 miles, and must permission be obtained before sketching at any of them?"

The church of Winterdyne is a building chiefly of the early Norman style, with two aisles, containing work of several styles, but chiefly Perpendicular. At Dowles the manor-house is a substantial half-timber building of the 14th century. Astley Church exhibits some good Norman work. The tower and chancel of an ancient church erected in the 11th century still remain at Tenbury. Brockleton Church has two Norman doorways and portions of Decorated character. There is also a good example of an Early English church at Stoke Bliss, which was well restored in 1853. Stone Church is of the Decorated style and consists of a small chancel, nave and tower. At Hartlebury Junction is a Decorated church (restored 1836), but with an Elizabethan tower. A large Decorated chancel with triple sedilia remains at Kidderminster. The nave is Early English, with Perpendicular clearstory. The lofts and massive tower are Perpendicular. The Perpendicular building adjoining the chancel was once a grammar school. There is a monument at Wolverley Church to Mrs. Knight which is said to be one of Flaxman's best works. The front of Chaddesley Cobbet is a fine specimen of Norman work: the chancel is Decorated, with fine traceried windows and good sedilia. H. Y. M.

HEBDEN BRIDGE.—A. writes: "Kindly inform me of any medieval work in Grantham suitable for the R.I.B.A. testimonies of study."

Grantham is a town of great antiquity, though of this it shows but few signs, being built almost entirely of particularly glaring red bricks. The only objects of interest are the "Angel Inn" and the parish church. The gateway of the former dates from the reign of Edward III., while the rest of the front dates from about 1450. The parish church is dedicated to St. Wulfram, Archbishop of Sens, about 680, of whom some relics are said to be preserved here. The present church has portions of all the Gothic styles, but is chiefly of the best period of the Early English and Decorated. Three late Norman pillars, dating from about 1170, still remain. At about the same time as the "angel choir" of Lincoln was built (1280) the Norman nave was extended two bays westward and the tower was begun, and the magnificent north aisle was built as far as the first bay of the chancel. The windows in this aisle are very fine and particularly good examples to measure for testimonies of study. The north doorway is of the same date, but unfortunately is badly mutilated. Fine windows are also to be seen in the south aisle. The south aisle of the chancel, which was probably the Lady Chapel, is flowing Decorated, about 1360. The pillars of the arcade seem too slender for the capitals, and perhaps were earlier. At the east end of both aisles are large round turrets, and at the junction with the nave are picturesque octagonal turrets surmounted by spirelets which formerly gave access to the great rood loft. The north porch, which also has spired octagon turrets, was likewise added at a late Decorated period. This porch is very remarkable as having served for a chapel, a fact which is shown by the piscina in its east wall, though not only was the porch a thoroughfare but there is an open archway in both walls, so that services must have been performed almost in the open air. The vaulting for its parvise caused the mutilation of the fine Early English doorway inside. The arches of the eastern bay of the nave were built and the north aisle or Corpus Christi chapel was added to the chancel in the Perpendicular period about 1500. The hall chapel projecting beyond the Corpus Christi chapel is of poor Perpendicular work, dating about 1520. The tower, which is about 140 feet high and 34 feet square on plan, is one of the greatest works of the fourteenth century. It is in four stages, the first containing the west door and window, which are richly decorated with ball flowers; the second has three bands of decoration, two of trefoil arcades and one of a remarkably fine quatrefoil diaper; the third is pierced with deeply-set double lights with crocketed hood moulds, and is crowned with octagonal turrets with spirelets. Above the tower rises a magnificent spire to a height of 281 feet above the ground. The spire is somewhat earlier than the famous spire of Salisbury, and in the opinion of Sir Gilbert Scott "stands second to it only among English steeples."

H. Y. M.

Technical College for Textile District.

GLASGOW.—J. B. writes: "Please give some information about books or back numbers of your paper which might prove useful in the planning of a technical college for a textile district."

We are unable to give you the desired information.

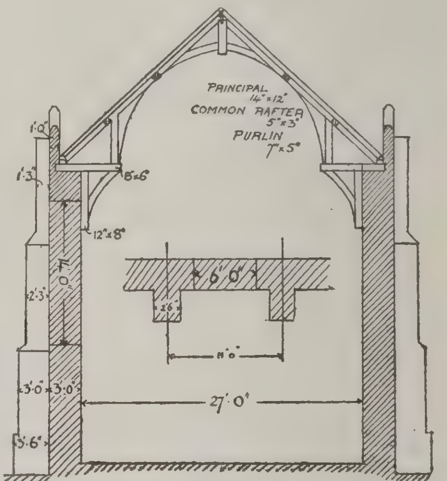
"Gladiator" Water Closets.

MANCHESTER.—X writes: "Who is the maker of these?"

We have made enquiries, but cannot ascertain who is the maker.

Stress Diagram for Hammer-Beam Roof.

LONDON.—CHAPEL writes: "The accompanying diagram shows open hammer-beam roof over a 27-ft. span, with lead roof. (1) Are the figured scantlings strong enough? Kindly show me how to determine (*a*) the thickness of wall and buttress sufficient to resist thrust from roof; and (*b*) whether increased weight is required in the form of a pinnacle."



The writer has made several attempts to construct a stress diagram for this roof with vertical loading and with the wind on one side, but has not succeeded to his satisfaction. He can only say that it is not a desirable form of truss, and no indication is given that the joints would be properly formed. The buttresses appear to be sufficient. HENRY ADAMS.

Damp-Course.

CORK.—K. writes: "In 'Specification' No. 9, p. 171 (10), a damp-course is specified composed of pitch and Russian tallow, mixed and deposited on walls while hot, but the proportions of the mixture are not given. Kindly state how this damp-course should be mixed and prepared. Also please state whether there is any special advantage in mixing together tar, pitch, Russian tallow, sand and cement for a damp-course. If so, kindly give proportions and mode of mixing."

Any material which is impervious to moisture, and therefore will prevent damp rising, may be used as a damp-course. Of the many materials commonly used, "pitch" or, more properly speaking, "mineral pitch" or "bitumen"—the principal constituent of "asphalt"—is a most valuable one and forms a most effective protection if laid about ⅜in. thick. The Russian tallow is only added in small quantities for the purposes of easy manipulation, and experience will quickly decide as to how much should be put into the melting pot. Sand is added to give bulk to the composition, and tends also to render it harder and less likely to ooze out upon the face of the wall. You will find some interesting details referring to the various damp-proof materials in Rivington's "Building Construction," and especially concise information with regard to asphalt in "Materials, Part III."

F. S. I.

Floor for Covered Yard.

DUNGANNON writes: "What is the best floor to put down in a large covered yard and gateway where there is heavy carting in and out? An office is near by, and much noise created by carts would be objectionable."

A Seyssel asphalt floor on 6ins. of Portland cement concrete (1 cement, 2 sand, 5 broken stone or hard brick) would be satisfactory. The next best floor would probably be jarrah blocks on concrete.

HENRY ADAMS.

Stopping for Leaks in Roof.

Referring to a recent enquiry in these columns about stopping leaks in roofs made of iron, zinc, &c., a correspondent writes pointing out that "Lino" solution will meet the requirements. This is obtainable from Mr. Chr. Hanson, of 2, Baronsfield Road, East Twickenham.

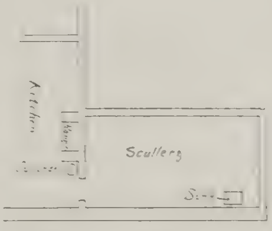
Heating Linen Cupboard from Hot-Water Service.

HARROW-ON-THE-HILL. — L. writes: "The accompanying sketch (redrawn) shows alterations to the hot-water service in a house to which I have recently made alterations and additions. It is found that the water will not circulate round the linen cupboard. Please state whether the slight dip shown on the left-hand return of kitchen chimney breast is sufficient to prevent circulation, and, if not, please explain where the error lies and suggest the least expensive way of rectifying same. Perhaps the service to linen cupboard should have been taken off the expansion pipe higher up—say, above the first floor ceiling level? My client wants the cupboard amply heated."

The flow of hot water is stopped either by (1) air bubbles accumulating in the dips, or (2) at the air-cock (which must be opened till water comes, at least once a day), or (3) by the return water not being chilled to be heavy enough to drive the hot water along the pipes. No doubt all these causes are at work. The pipes in the cupboard are not laid to give the best circulation, and even with their present lay an air-pipe, ¼-in. bore, is better than the cock. The pipe method is continuous, silent and dry; whilst the cock is occasional and wet. The air-pipe is shown on the new drawing, and the best lay of the pipes is also shown; the flow uphill is shorter, the return downhill is longer, and the circulation is, therefore, as quick as it can be. The dips should be taken out. Perhaps the floor timbers prevent the pipes being shortened as to the dotted lines in Figs. 1a and 3a.

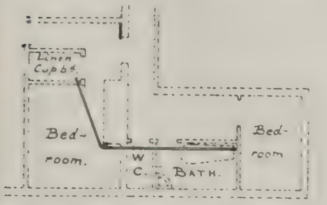
There are three ways to mend matters. (1) Remove the air-cock and fit in its place an air-pipe led up through the ceiling to the height shown in Fig. 1a; then disconnect the return pipe from the cupboard at the side and top of the cylinder, add a piece to it and re-connect it at the bottom and side of the cylinder to the cold-water pipe (which will often feel hot) from the garret tank to the cylinder. The dips on the left side of the chimney-breast are to be taken out, and these flow and return pipes relaid to a continuous, even slope. (2) The cheapest way, and one which is likely to meet the full case, is to remove the dips and relay those pipes, as for No. 1; then relay the heating pipes to the lines shown in Fig. 1a, and fit the new air-pipe. The air-cock had better be removed, to avoid risk of leaks or drips. It should be possible to do all this without breaking or starting a main joint. When fitting the air-pipe, care must be taken that the little pipe does not project at all into the bore of the large pipe, and that the air-pipe is fair on the top and at the highest part of the water-pipe. This method should be tried first. (3) The whole system can be improved by connecting a new pipe, say, ¾-in. bore, at the bath, leading it up the wall and through the ceiling, and up in the garret to a height, say, half the full-water-level in the tank. Then give it a small half-circle bend down (at the top of which an air-pipe is to be fitted) and a reverse bend to a continuous slope down to the point above the corner of the linen cupboard, all as shown in Figs. 4a and 5a. The pipe should be clasped or stapled to a board on edge, fastened above the joists, to keep it stiff and straight. Then the pipe goes down the wall of the cupboard to the heating pipes, which are to be relaid to the lines of Fig. 1a, the air-pipe shown there being now the down-corner. After leaving the heating pipes it goes to the top and side of the cylinder, as shown in Fig. *2a*. The present flow-pipe on the chimney-breast will be cut out and can be used in the garret. The pipe from cylinder to bath must rise all the way if possible, and must certainly be without dips. This will much reduce the amount of "dead" water in the bath and sink pipes, and deliver hot water almost as soon as the taps are opened, whilst the circulation of water will be quicker, and thus supply more heat.

INGENIOR.



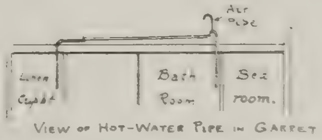
PLAN OF GROUND FLOOR

FIG. 6A



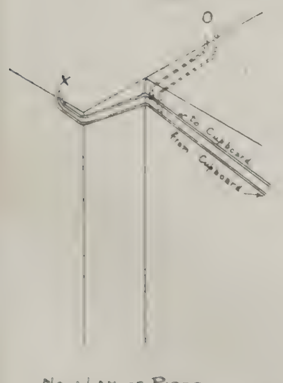
PLAN ABOVE 1ST FLOOR.

FIG. 4A



VIEW OF HOT-WATER PIPE IN GARRET FROM BATH TO LINEN-CUPBOARD

FIG 5A



NEW LAY OF PIPES ON RETURN OF CHIMNEY-BREAST.

FIG. 3A

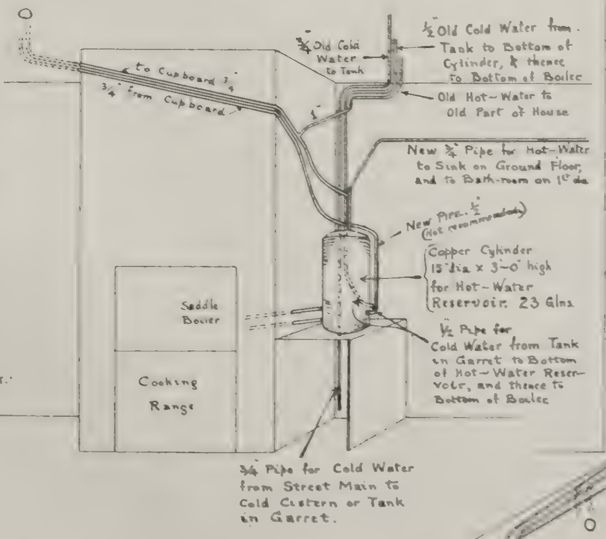
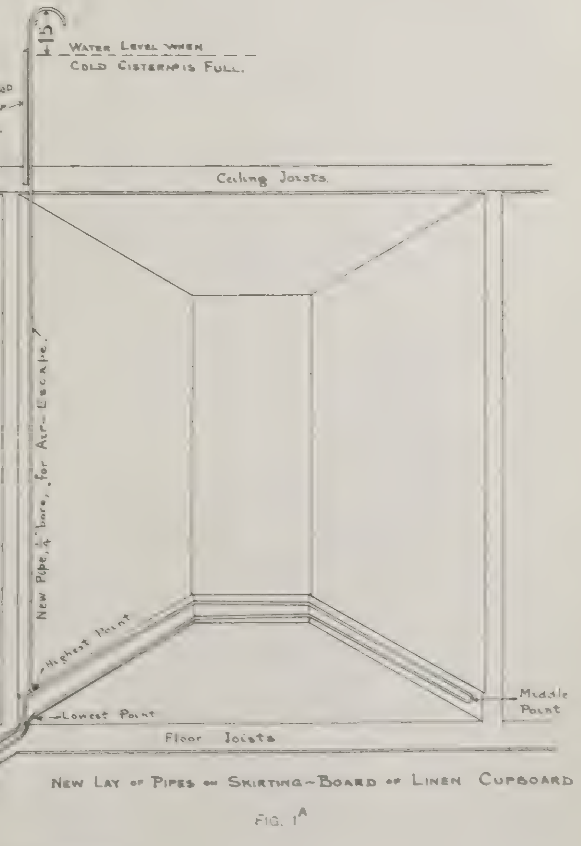

O
to Cupboard ¾"
¾" from Cupboard
1"
¾" Old Cold Water to Tank
½" Old Cold Water from Tank to Bottom of Cylinder, & thence to Bottom of Boiler
Old Hot-Water to Old Part of House
New ¾" Pipe for Hot-Water to Sink on Ground Floor, and to Bath-room on 1st do.
New Pipe ½" (not recommended)
Copper Cylinder 15" dia x 3'-0" high for Hot-Water Reservoir 23 Glns
½" Pipe for Cold Water from Tank in Garret to Bottom of Hot-Water Reservoir, and thence to Bottom of Boiler
Saddle Boiler
Cooking Range
¾ Pipe for Cold Water from Street Main to Cold Cistern or Tank in Garret.

FIG. 2A


15"
Water Level when Cold Cistern is Full.
Bar of hand to hold up the pipe.
Ceiling Joists.
New Pipe, ¼" bore, for Air-Escape.
Highest Point
Lowest Point
Middle Point
Floor Joists
O
x

NEW LAY OF PIPES ON SKIRTING-BOARD OF LINEN CUPBOARD

FIG. 1A

HEATING LINEN CUPBOARD FROM HOT-WATER SERVICE.

Dilapidations.

York writes: "In an ordinary yearly tenancy of a house of, say, £30 rental, where the tenant agrees to leave the premises in tenantable repair, fair wear and tear excepted, is he bound to paint, paper and distemper where this work is only dilapidated by fair wear and tear? For instance, must a paper be renewed by a tenant on leaving, merely because it is dirty through ordinary usage? I think a judge once remarked, in deciding some case, that painting was only decorative, and a tenant could not necessarily be called upon to renew it unless there was some special covenant, or it was necessary for the preservation of the structure."

The actual amount which a tenant is liable to do depends considerably upon the wording of the whole of the repairing covenants of the lease, and from the rather meagre details given I can only reply in a general manner. *Painting: ing:* The tenant is in no case liable for painting more than is necessary to preserve the woodwork (*Crawford v. Newton*), and in this case is, therefore, only liable to repaint in case of misuse or damage. *Paper:* The liability under this head only extends to replacing torn or loose portions and not to the replacement of wall-paper merely because it is dirty or faded. You are quite right in your concluding remarks as to the general tenour of the law.

F. S. I.

Section of Rolled Steel Joist.

London.—B. writes: "In the R.I.B.A. Final Examination do the examiners expect a question such as the following to be answered—more particularly as regards finding the correct section of the metal?—'A rolled steel joist (or joists) 20ft. span in clear rests on two stanchions 15ft. high. The joist carries a load of 10 tons, distributed over the central 10ft. of its length, and also a concentrated load of 5 tons, 3ft. from one of the stanchions. Draw a section $\frac{1}{4}$ full size through the joist, also a horizontal section through the stanchions.'"

The bending moment diagram for the distributed load should be drawn out and then the bending moment diagram for the concentrated load, so that the maximum bending moment can be scaled off. Then approximately the depth required will be 2 max. make the bending moment ton-ft., which should be not less than $\frac{1}{24}$ span. The stanchion may be estimated roughly by allowing 4 tons per sq. in. for the stress upon it.

HENRY ADAMS.

Dampness on Internal Walls.

Enquirer writes: "A house of two storeys, built about twelve months ago, with 14-in. hollow walls, 4½-in. work outside, shows decided traces of dampness on all the internal walls. The cavity is properly ventilated, twisted wall ties were used, a dampcourse inserted 6ins. above ground line to all walls, and there was no suspicion of salt in the sand: further, the eaves project 18ins. When the plastering was apparently quite dry the walls were coloured with 'Duresco' mixed with the petrifying liquid in the ordinary way. It is suggested that the apparent dampness which is evenly distributed over the walls arises from condensation owing to the petrifying liquid having stopped suction. Ample provision has been made for cross-ventilating the rooms by means of windows, but the climate is very moist. Can you suggest a remedy?"

From the details given it appears to be almost certain that water does not penetrate from the outer wall, and the only suggestion I can make in this connection is that the fact that the bottom of the cavity is clear of fallen mortar should be ascertained with certainty; it can be cleared by opening each end if need arise. I have myself had considerable trouble with distemper on newly-built walls, even when they appeared to be quite dry before its application. I advise a little patience, and a fresh coat of "Duresco" at the end of the summer.

F. S. I.

Motor-Car House.

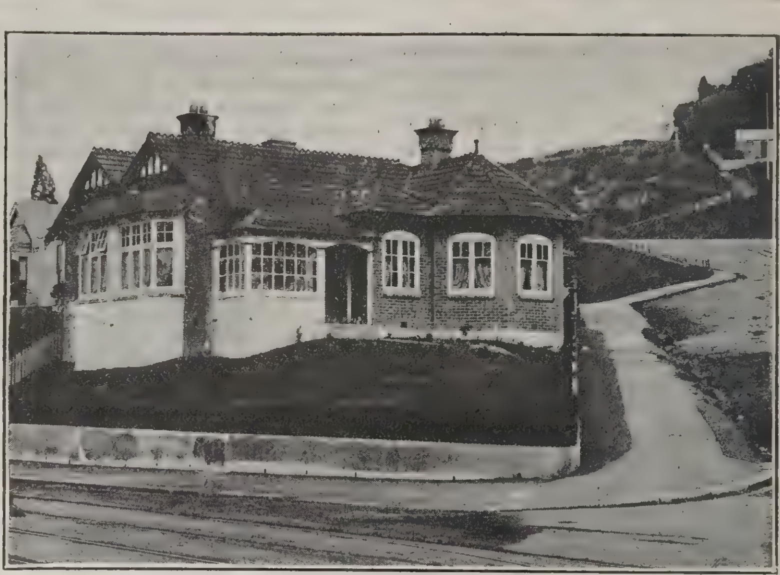
Rotherham.—Old Subscriber writes: "What size should a motor-car house be? Also state size and depth of pit, and suitable heating apparatus."

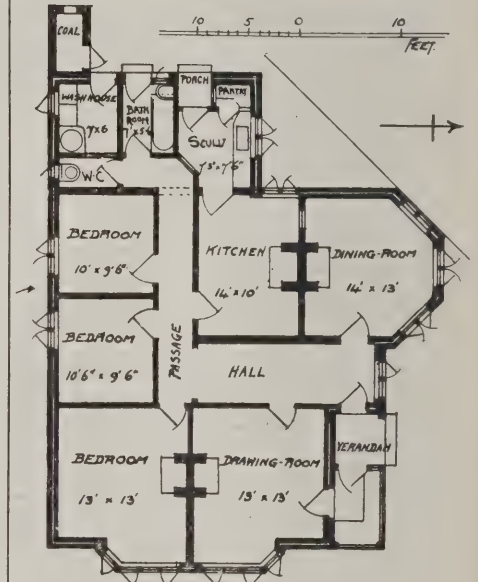
A small motor-house and workshop (with sizes figured on the drawings) was described and illustrated in our issue for May 9th, 1906, and "Some Notes on Motor Houses," with illustrations of the paving and pit, appeared in our issue for August 10th, 1904. Also, in "Specification" No. 7 is an article on "Stables for Motor Cars." For a small car the shed should be about 10ft. by 14ft. and the pit about 2ft. 9ins. wide, 6ft. long, and 4ft. deep.

Book-Keeping for Builders.

Workington.—J. F. writes: "Which is the best system of book-keeping in connection with a builder and contractor's business? Also what books (if any) can I get on the subject?"

There is a book by Mr. Sidney Saker on "Builders' Book-keeping," which was published from 95-97, Finsbury Pavement, E.C., price 3s. 6d. Doubtless this could be obtained from Mr. Batsford. A series of articles on the subject appeared in our columns some years ago. We also have in hand another article, which we hope to publish shortly.





SMALL HOUSE AT DUNEDIN, NEW ZEALAND, BASIL B. HOOPER, A.R.I.B.A., ARCHITECT.

This little building is interesting, as showing the kind of work done in the Colonies. The site is somewhat restricted, and that largely determined the arrangement of the plan. The roof is covered with Marseilles interlocking tiles, which can be put on at Dunedin from £2 15s. per square; plain tiling costs about £7, and, consequently, is almost prohibitive. The sashes had to be made without sash-bars to suit the client's wishes. The cost was about £840, complete with fencing, &c. Mr. Basil B. Hooper, A.R.I.B.A., of Dunedin, N.Z., was the architect.

Obituary.

Mr. John A. Atkinson, architect and surveyor, of Crewe, died on Wednesday last.

Mr. J. E. Mills, a well-known Lancashire architect, died at Heywood recently. He was in his 62nd year.

Mr. J. C. Traylen, A.R.I.B.A., of Stamford, died recently, aged 62. He restored many of the churches in the district and for many years was diocesan architect for the Bishops of Peterborough.

Mr. S. J. Waring, founder and head of the firm of Waring & Gillow, Ltd., died on Sunday night last at Llandudno. He had been seized with paralysis on Thursday night. Mr. Waring was 75 years of age.

SALFORD BATHS COMPETITION.

A few months ago the Baths Committee of the Salford Corporation selected fifteen architects from a large number of applications to submit designs in a limited competition for public baths proposed to be erected in Derby Road, Weaste. Only eight of the fifteen competing architects ultimately submitted schemes; the Corporation state that, on account of pressure of work, the remaining competitors did not find time to send in designs. Reference to the conditions of the competition, however, puts another aspect on the case, particularly when it is noted that the Baths Committee were to adjudicate, and the drawings had to be sent in under a *nom-de-plume*.

Only the accepted design could be inspected during last week, so that no comparison could be formed between the various schemes. The committee and officials have been most reticent on the subject. Their award may be satisfactory to themselves, but it is to be regretted that a large corporation should set such a bad example. Seeing that there were so many outside architects competing, it would have been better to appoint an outside professional assessor, so that there could be no possibility of local architects using influence with the Baths Committee. We believe that the decision and award has been by fair and proper means, though undue privacy has been a feature of the workings of this committee.

The ground set apart for the building offered no special difficulty in the planning, being regular in shape, with a slight fall from the front street to the back of the site. A glance at the plans (published as a centre plate in this issue) shows that there has been no land to spare after providing the accommodation. The conditions were most explicit, and detailed the construction and materials of the baths. They were evidently prepared by a competent authority, and left little to be desired, except the appointment of an assessor. The principal accommodation asked for included three swimming baths—first class, second class, and ladies' bath—with slipper baths adjoining; also committee room, manager's house, engineering department and establishment laundry. This was to be regarded as the basis on which the competitive designs were to be considered, though architects were at liberty to exercise their own judgment and experience so that the baths could be complete and up-to-date in every respect.

The cost of the complete baths, including engineering, was not to exceed £20,000, with a 5 per cent. margin.

Accepted Design.

The scheme submitted by Messrs. Mangnall and Littlewoods, of 42, Spring Gardens, Manchester, has been chosen by the Baths Committee. As a whole the plans are well-balanced and compact, with the swimming ponds centrally situated, and all exits and entrances conveniently disposed on the main road and side thoroughfare. The internal arrangement shows considerable care and thought to secure easy working and ample supervision, and also isolation of the sexes as far as possible. Objection might be taken to the women and first-class men entering in at the same doorway, though they separate in the men's hall. A small ante or corridor at the back of the ticket office would partially get over this drawback, as the men's slipper baths and swimming bath could not be viewed then from the women's turnstiles. Artistes' dressing accommodation is on the limited side. The windows lighting the committee room could be extended on either side with advantage. All the basement rooms should be better lighted, particularly those facing the main road. The elevations were illustrated by a coloured perspective. A ½-in. detail of portion of the principal front in monochrome completed the drawings, which were carefully prepared. Stone has been sparingly used, and the design suffers somewhat from the repetition of the ornamental features.

The basement and ground floor plans, containing the major portion of the accommodation, are self-explanatory. On the first floor over the principal entrance is a suite of rooms for the superintendent, comprising sitting room, kitchen, scullery, &c., also stairs to public gallery, the latter being carried round the men's first-class swimming bath. The superintendent's three bedrooms occupy the second floor above the kitchen offices. At the back of the site over the ground floor engineer's rooms and roof are the water tanks and ærating plant for filtering and re-heating of the water in the swimming baths.

The design placed second was by Mr. Horace T. Bonner, of London, and the design placed third by Mr. Ernest Woodhouse, of Manchester.

Among the competitors were the well-known bath architects, Mr. Alfred W. S. Cross, F.R.I.B.A., and Messrs. Spalding and Spalding, both of London.

CARPENTRY AND JOINERY MODELS.

By the invitation of the Department of Technology we had the opportunity of inspecting the models submitted by candidates in this year's carpentry and joinery examinations conducted by the City and Guilds of London Institute, which have just been on exhibition for the examiners' inspection. We are pleased to be able to call the attention of the building trades to the importance of these examinations, as proved by the great amount of admirable work that is submitted. Models are only required from candidates in the Honours Grade where two examinations are held—namely, a written and a practical examination, the models belonging to the latter. In the Preliminary examination and the Ordinary Grade the answers are wholly written. Each candidate in the Honours Grade was required to submit four models, and the high quality of the work shows that the City and Guilds of London Institute are doing a national work of great value to the building trades. The quantity of work submitted was surprising. This may be roughly estimated from the fact that the models covered about 1,685 square feet of tabling. Models are also required in other subjects, but carpentry and joinery is the largest division of the Institute's work. In this year's examination, however, the painting and decorating specimens cover 1,500 square feet of tabling, and the plumbing exhibits also occupied a good deal of space. A public exhibition of a few of these models is held every other year, but it would be well, in our opinion, if the whole of the models from each locality could be exhibited there, so as to encourage students. We understand that something of this sort is done now, but not quite so thoroughly as it should be. The exhibits need only be open for inspection for two or three days in each case.

Notes and News

Partnership.—Mr. Gilbert H. Lovegrove has entered into partnership with Mr. A. Wyatt Papworth, A.R.I.B.A. (son of the late Mr. Wyatt Papworth, F.R.I.B.A.), to carry on business as architects and surveyors under the title of "Lovegrove & Papworth."

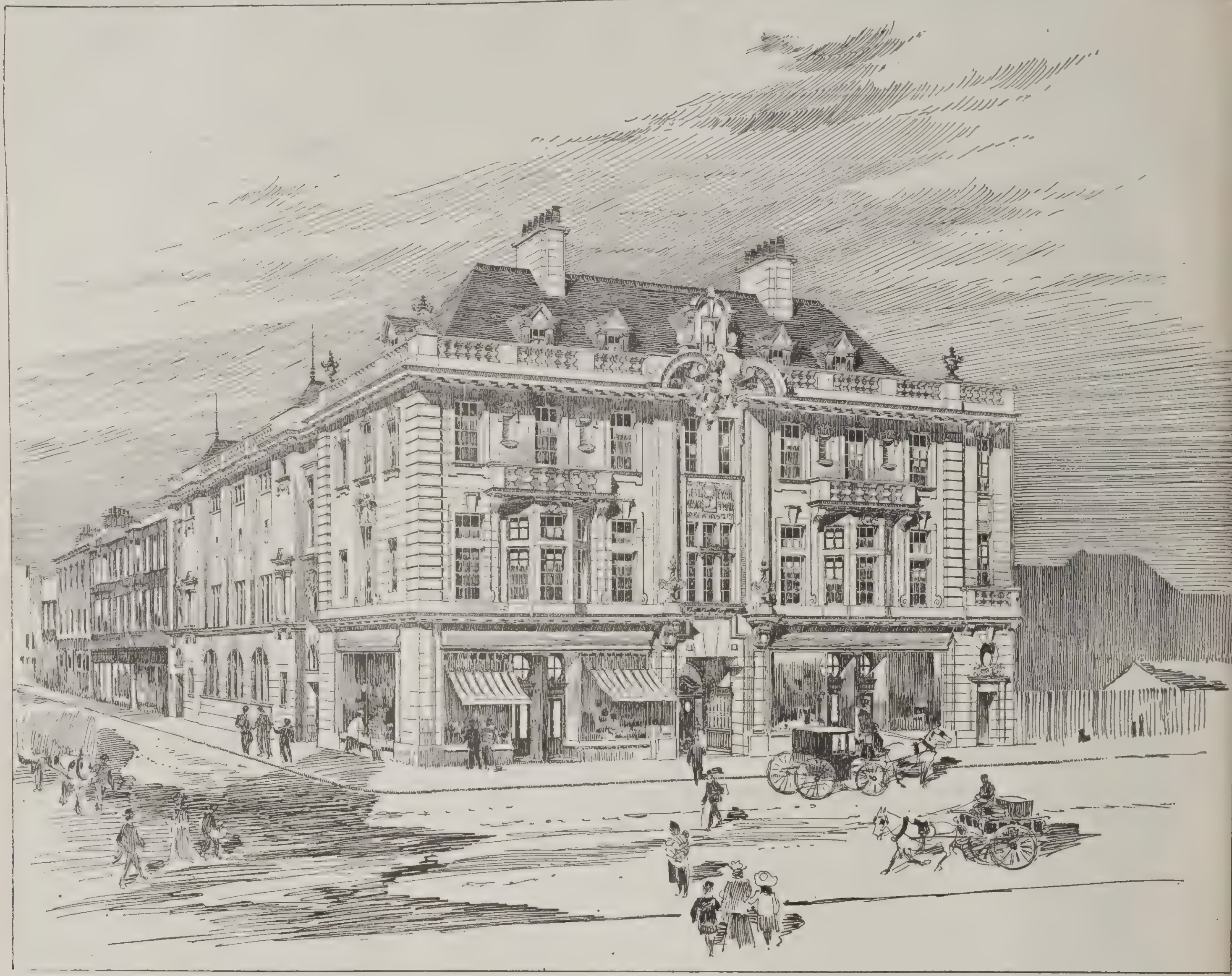
New Municipal Buildings, Wallsend-on-Tyne.—The foundation-stone of these buildings, in High Street East, was laid on Wednesday last. Messrs. Liddle and Browne, of Newcastle, are the architects, and Messrs. Franklin and Son the contractors for the work.

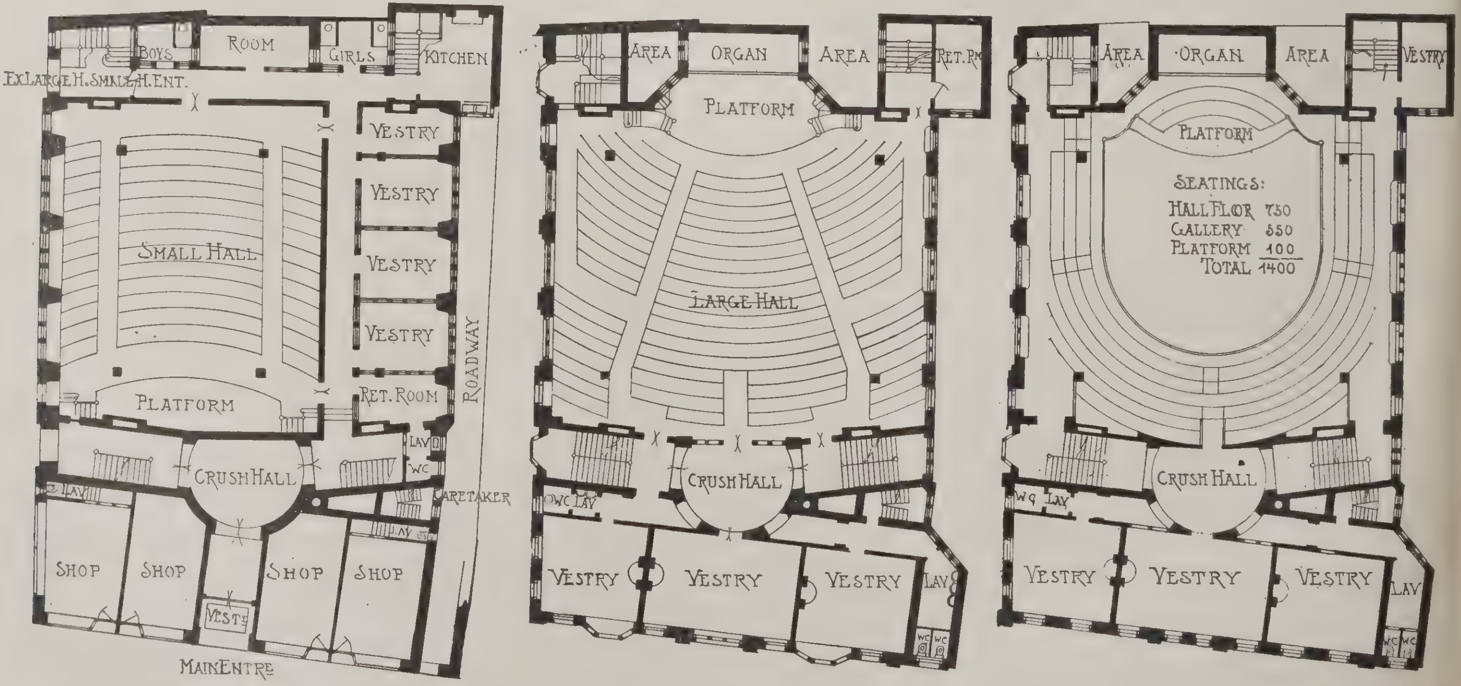
The Durolite Co., of 35, King William Street, E.C., have secured the contract for the whole of the wall-tiling at the new infirmary in course of erection at Manchester for the Prestwich Union. Messrs. Thomas Worthington and Sons are the architects and Messrs. R. Neill & Sons the contractors.

British Museum Extension.—His Majesty the King will lay to-morrow the foundation-stone of the new wing of the British Museum in Montague Place. Mr. John James Burnet, A.R.S.A., F.R.I.B.A., of Glasgow, is the architect for the work. The new building will have a façade of 386ft., comprising a single order of engaged Ionic columns resting on a podium about 10ft. deep. The foundations have been put in by Messrs. Charles Wall, Ltd.

Architectural Exhibition in Edinburgh.—To celebrate the jubilee of the Edinburgh Architectural Association—a body now in a flourishing condition, with over 400 members—an exhibition of architectural designs and drawings is being held at the Royal Scottish Academy Galleries, Edinburgh. The exhibition includes work by Scottish architects both living and deceased, and an interesting series of photographs of the latter is also shown, with biographical notes in the catalogue relating to each (these notes having been written by Mr. Hippolyte J. Blanc, R.S.A., president of the Association).

"Ancaster House," on the summit of Richmond Hill, adjoining the entrance to the Park, is to be demolished, and residential flats, called "Queen's Court," are to be erected on the site. Messrs. Palgrave & Co. are the architects. The buildings are to be erected in four separate blocks, connected by a colonnade. There will be a frontage to the Park of about 400ft., with a return frontage to Richmond Hill and Queen's Road of about 600ft. The elevations will be "quiet and unobtrusive," the principal ornament being gauged and carved brickwork with relief of rough-cast and green shutters. The buildings are to be surrounded with ornamental gardens, and a motor garage will be provided for the use of tenants. The total cost of the four blocks is not to exceed £110,000, and the architects estimate the time for completion at two years and six months.





Ground-Floor Plan.

First-Floor Plan.

Gallery-Floor Plan.

WESLEYAN HALL, PAISLEY. WATSON & SALMOND AND BRADSHAW & GASS, JOINT ARCHITECTS.

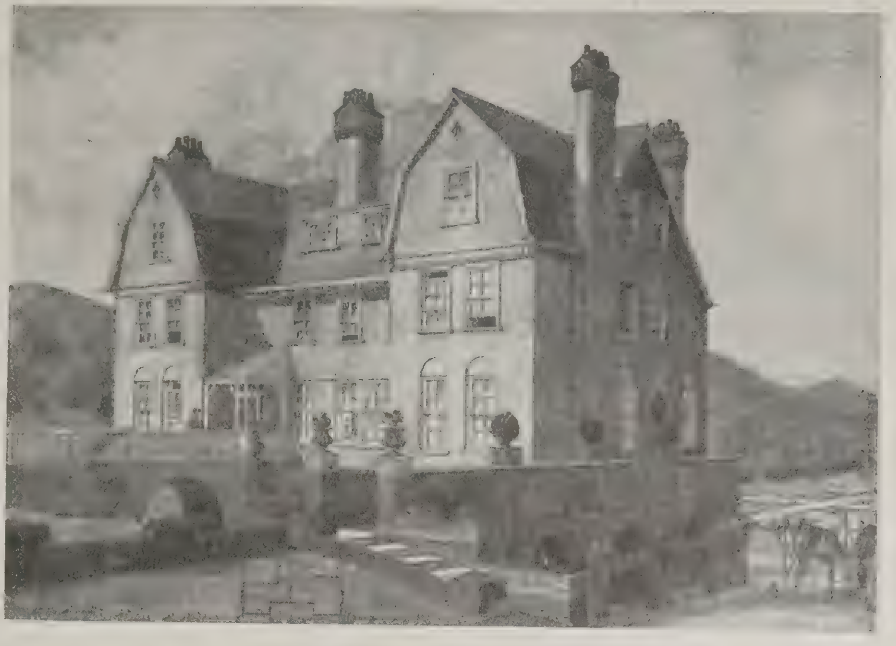
This building is in course of erection at the corner of Smithhills Street and New Smithhills Street, the frontage to the former being 76 ft. and to the latter 105 ft. The accommodation is shown by the plans above. The small hall on the ground floor is seated for 420 persons, and the large hall on the floor above for 1,400 persons, this large hall being 76 ft. by 67 ft. The estimated cost of the building is £15,000.

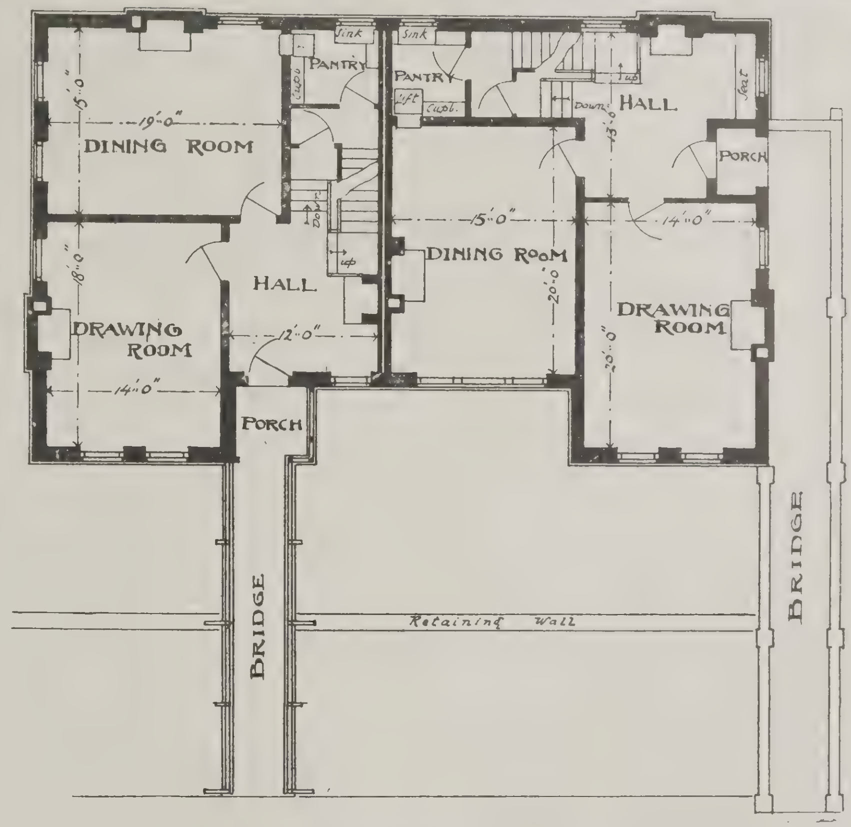
RESTORATION OF YORK MINSTER.

The flying buttresses along the nave walls of York Minster have now been completed. The work has been in progress for nearly two years, under the direction of Mr. G. F. Bodley, R.A. There are six flying buttresses on either side, and on the north side there have also been erected six pinnacles about 50ft. high in continuation of the vertical buttresses, and in harmony with the pinnacles on the south side. Concurrently with the building of the pinnacles and flying buttresses the work of renovation has been proceeding on the western front of the minster. The last part of this section of the work, that on the south-western tower, is now nearing completion, and it is expected that the scaffolding—which has been coming down slowly and almost imperceptibly for nearly two years—will be entirely cleared away during next month. The next work to be proceeded with is the repair of the Five Sisters window, which is in a very bad condition. It is probably the oldest window in the building, and it has been a source of anxiety to the Dean and his advisers for a long time. Scaffolding has been erected on the outside preparatory to starting the work of encasing the old glass between new windows of leaded glazing. It would be dangerous and, indeed, impossible to attempt to touch the ancient glass itself. It is too fragile, but it can be thoroughly protected and preserved from further decay by encasing it on either side with leaded glazing of the kind already adopted in other windows in the minster.

Restoration of Tewkesbury Abbey.

The restoration of the west front and towers of Tewkesbury Abbey is now in progress, and will shortly be completed. The work is being carried out by Messrs. Collins and Godfrey, under the supervision of Mr. J. Oldrid Scott, the Abbey architect. The stonework is in a very bad condition, and the towers, which retain the original masonry, were in danger of destruction from long neglect. Plants of various kinds had taken root between the stones, and the effect of these growths, combined with the action of frost, was gradually shattering the towers.





HOUSES, GREAT MALVERN. A. TROYTE GRIFFITH, ARCHITECT.

These houses contain in addition to the rooms shown on the ground-floor plan another sitting-room and the usual offices in the basement, and seven bedrooms, bathroom, etc., on the upper floors. Owing to the level of the ground being 12 ft. below the road (from which the houses are set back 40 ft.) access to the front doors is obtained by two foot-bridges. The lower portion of the external walls and bridges are built of Malvern Hill stone and Broseley bricks, and the upper portion with local bricks rough-casted. The builder was Mr. W. James, and the architect Mr. A. Troyte Griffith, both of Malvern.

THE NEW ASYLUM AT EPSOM.

The new Long Grove Asylum at Epsom was formally opened on June 15th. It has been erected by the London County Council, the architect being Mr. George T. Hine, F.R.I.B.A. The buildings accommodate 2,020 patients. The patients' quarters in the main asylum comprise wards on each side for the different classes—namely, sick and infirm, acute and refractory, epileptics and chronic quiet and working patients—800 males and 800 females. The wards are in continuous buildings on the pavilion system, all intercommunicating. There are main corridors communicating with each block for general service, and through these patients will pass to the recreation hall, workshops, and laundry buildings. The corridors, unlike those in asylums generally, are merely covered ways, being open at the sides, and in consequence of this it is anticipated a more healthy condition will result, and also a greater immunity from fire. Electricity for lighting and power purposes is generated at the central station of the Horton estate, where the asylum's engineer has installed an electrical plant sufficient for lighting three of the existing asylums on this estate. Adjoining the boiler-house is a water tower, 130ft. high, in which are tanks holding 80,000 gallons of water for domestic use, and to serve as a reservoir in case of fire. In addition to the main asylum, there are eight detached blocks of villas, accommodating 400 patients. The heating and ventilating arrangements and the system of hot-water supply have been carried out by Messrs. Strode & Co., the well-known engineers of 48, Osnaburgh Street, London. Four Lancashire boilers, each 30-ft. long by 8-ft. diameter, supply the necessary steam. Heating is on the atmospheric system, which has many advantages for large buildings of this character. The total amount of radiator surface installed is about 30,000 sq. ft., and about 18 miles of piping have been fitted, varying in size up to 10-ins. diameter. Ventilation is on the "natural" system. It is estimated that £490,000 will cover the entire outlay for the asylum. This will show an average cost of £243 per bed on the 2,020 beds provided, accounting for everything excepting land and equipment.

New London Buildings

At yesterday's meeting of the London County Council the Building Acts Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics* :—

Five buildings on the south-eastern side of Perry Hill, Catford, on the application of A. R. Westworth, on behalf of A. Cooper. (*Consent.*)

Motor shed at the rear of "The Hermitage," No. 290, Fulham Palace Road, Fulham, abutting upon Niton Street, on the application of E. W. Lewis. (*Consent.*)

15 houses on the eastern side of Wallingford Avenue, Kensington, northward of Kelfield Gardens, with bay windows nearer to the centre of the party wall than the extreme amount of their projection, on the application of Trant, Brown & Humphreys, on behalf of Daley & Franklin. (*Consent*)

Additions at "Lynwood," No. 16, Addison Crescent, Kensington, on the application of F. G. Knight, on behalf of H. Liddell, M.P. (*Consent.*)

One-storey coal office building on the eastern side of Baring Road, Lewisham, on the application of A. Durbin. (*Consent.*)

Buildings on the southern side of Elgin Avenue, Paddington, abutting upon Castellain Road, on the application of A. Young, on behalf of A. T. Miles. (*Consent.*)

Addition over the existing one-storey shop in front of No. 2, Strathblaine Road, Battersea, on the application of C. Sewell. (*Refusal.*)

Projecting shops in front of Nos. 199 to 215 (odd numbers only) inclusive, High Street, Homerton, on the application of R. S. Wilkinson, on behalf of M. Rosenberg. (*Refusal.*)

Addition to the Acme Laundry, No. 226, Garratt Lane, Wandsworth, on the application of G. S. Wain, on behalf of W. R. Stacey. (*Refusal.*)

Mission building on the north-eastern side of Little Manor Street, Clapham, on the application of F. J. Bacon, on behalf of the Rev. Canon C. P. Greene. (*Consent.*)

Building to the eastward of No. 79, Ronald's Road, Islington, on the application of H. J. White, on behalf of A. E. Bailey. (*Consent.*)

Additions to St. Andrew's Mission Hall, Hazelwood Crescent, Kensington, on the application of E. H. Bullock, on behalf of Rev. S. W. Langsford. (*Consent.*)

Building on the southern side of Hilliard's Court, Wapping, on the application of Fair and Myer, on behalf of A. Jacob & Co. (*Consent.*)

Day-room and workshed at St. Saviour's Union Workhouse, on the application of A. J. Wade, on behalf of the Guardians of the Poor of Southwark Union. (*Consent.*)

New Companies.

SERPENTINE STONE SYNDICATE, 36, Southampton Street, Strand, W.C. Capital : £300.

JAMES ALLAN, contractors, builders, &c., 167, Woodville Road, Cardiff. Capital : £7,000.

CHILD BROTHERS, art metal workers, &c., 67a, Newtown Row, Birmingham. Capital : £1,000.

MCFERRAN & CO., LTD., timber, tile, slate, and cement merchants, 12, 13 and 14, Tara Street, Dublin. Capital : £5,000.

NEWTON, SMITH & CO., manufacturers of and dealers in church and school furniture, fittings, &c., 74, Bridge Street, Manchester. Capital : £5.000.

ELSE & CO., to carry on in Liverpool or elsewhere the business of manufacturers' agents for paint, &c., 38, Crane's Buildings, Church Street, Liverpool. Capital : £1,000.

Incorporated Institute of Certified Carpenters.—Sir William White and Mr. Harry Hems have been elected Honorary Fellows of this Institute.

The new Architect to the Carmarthenshire Education Committee is Mr. W. Vincent Morgan, A.R.I.B.A., of Carmarthen, formerly of the firm of Messrs. G. Morgan and Sons.

The new Buildings at Wellington College, Berks., were opened by the King on June 17th. They include a new dining-hall, masters' common-room, matron's department, kitchens, and other offices, and have been erected from the designs of Mr. C. J. Blomfield, F.R.I.B.A. His Majesty also unveiled the Wellington Memorial in the chapel. This is of marble, bearing the names of sixty-five old Wellingtonians who fell in the South African War, and is flanked by two bronze figures (by Mr. Brock, R.A.) representing "Courage" and "Faith."

Tenders.

Addressed postcards on which lists of tenders may be stated will be sent post free on application to the Manager, BUILDERS' JOURNAL, *Great New Street, Fetter Lane, E.C.*

Information from accredited sources should be sent to "The Editor" at latest by noon on Monday if intended for publication in the following Wednesday's issue. Results of Tenders cannot be accepted unless they contain the name of the Architect or Surveyor for the work.

Baginton (Coventry).—Accepted for the erection of eight labourers' cottages and additions to farm buildings at the Corporation sewage farm. Mr. J. E. Swindlehurst, city engineer and surveyor :—

A. J. Lord, Wolston, near Coventry... £3,000

Blackburn.—For the construction of the main sewers and two outfall sewage works, in the parish of Billington—(1) Langho scheme and (2) Whalley End scheme—for the Blackburn R.D.C. Mr. Fred. W. Duckworth, surveyor and engineer, Richmond Chambers, Blackburn :

Firth & Co., York	£6,727	3	2
T. H. Macdonald, Oxford	4,984	17	0
A. J. Cottle, Tarporley, Cheshire	4,981	5	7
W. H. Bury, Oswaldtwistle	4,911	13	10
J. Bentley & Co., Bradford	4,886	5	2
Jowett Brothers, Burscough	4,722	11	5
Edmundson & Wyatt, Oldham	4,718	0	0
E. Lewis & Son, Blackburn	4,644	0	0
S. Johnson & Son, Salford	4,635	8	9
J. Totty, Bradford	4,634	10	0
W. Pollitt, Bolton	4,356	16	1
Ditto	4,300	0	0
J. Riding, Osbaldistone	4,131	1	9
W. Jenkins & Son,* Blackburn	4,175	0	0

* Accepted.

Chingford.—For the erection of new sorting office at Chingford, for H.M. Office of Works, &c. :—

J. S. Linin & Co.	£2,897	0	0
T. Pike	2,890	0	0
J. Behrend	2,718	0	0
W. Irwin	2,699	7	10
A. Hood	2,545	10	0
E. E. Winch	2,497	0	0
Sabey & Son	2,464	0	0
Allen Brothers	2,430	0	0
F. Webster & Son	2,398	15	7
J. W. Drake	2,393	0	9
C. S. Foster & Son	2,359	0	0
H. C. Horswill	2,328	0	0
Brand, Pettit & Co.	2,325	0	0
Hyde & Co.	2,263	0	0
F. & A. Willmott	2,257	0	0
Fitch & Cox	2,210	0	0
Crisp & Jones	2,199	0	0
Galbraith Brothers	2,194	7	8
W. E. Westgate	2,136	0	0
F. & G. Foster	2,098	0	0

Coventry.—Accepted for extensions to the buildings of the electricity works, Sandy Lane, for the Electric Light Committee. Mr. J. E. Swindlehurst, city engineer and surveyor :—

Kelley & Son, Foleshill, Coventry ... £4,971 18 11

Crosby (Lincs.).—For the erection of eight dwelling houses. Mr. W. H. Buttrick, P.A.S.I., architect, Scunthorpe :—

Whitfield	£1,384
Pattister	1,370
Brown	1,295
Quible	1,290
Robertshaw,* Scunthorpe	1,240

* Accepted.

Architect's estimate, £1,280.

London.—For the enlargement and improvement of the Hackney Downs secondary school, for the London County Council :—

Stevens & Sons, Yonge Park	£11,051	0	0
G. S. S. Williams & Son, Barnsbury	10,099	0	0
A. Porter, Tottenham	9,984	0	0
C. Wall, Ltd., 4, Lloyd's Avenue	9.925	10	7
E. Lawrance & Sons, City Road	9,815	0	0
J. Grover & Son, New North Road	9,782	0	0
L. H. & R. Roberts, Islington	9,741	0	0
J. Willmott & Sons, Hitchin	9,683	0	0
J. Chessum & Sons, Bow	9,670	0	0
Perry & Co., Bow	9,504	0	0
W. Lawrence & Son, Tottenham	9,384	0	0
McCormick & Sons, Essex Road	9,096	0	0
W. Harris,* Steam Joinery Works, North Woolwich	9,019	0	0

* Recommended for acceptance.

Architect's estimate, £9,796.

London, E.C.—For pulling down and extending the "City Press" premises in Half Moon Passage, Aldersgate Street, E.C. Messrs. Merrin & Wagstaffe, architects, 31, Fenchurch Street, E.C. Quantities by Messrs. W. H. Barber & Son, 22, Buckingham Street, Adelphi, W.C. :

F. & F. J. Wood	£3,666
Rossiter	3,200
Johnson & Co.	3,120
W. Lawrence & Sons	2,952
J. C. Mather	2,950
Barrett & Power	2,703
Perry Brothers	2,697
Mattock & Parsons	2,677

London, N.E.—For footway, paving, kerbing, channelling, &c., at High Street, Homerton, Marsh Hill, and at Sidney Road, for the Hackney Borough Council. Mr. Norman Scorgie, M.I.C.E., borough engineer and surveyor :—

J. Mowlem & Co., Westminster	£1,465	0	0
W. Griffiths & Co., London, E.C.	1,442	14	11
T. Adams, Wood Green, N.	1,414	11	7
G. J. Anderson, Poplar	1,302	4	2
E. T. Bloomfield, Tottenham	1,288	9	9
G. Porter, 2, Arthur Street, Well Street, Hackney, N.E.	1,265	10	11

* Accepted.

London.—For the erection of new buildings for central stores, for the Metropolitan Asylums Board :—

B. E. Nightingale, London, S.E.	£21,646	0	0
Hyde & Co., Norwood Junction	19,608	0	0
J. Garrett & Son, Balham Hill	19,112	0	0
W. Reason, London, E.C.	18,998	0	0
B. & A. Gale, Old Kent Road	18,619	0	0
Fitch & Cox, Enfield	18,359	0	0
T. D. Leng, Deptford	18,283	0	0
Martin, Wells & Co., Vauxhall	17,950	0	0
J. Smith & Sons, South Norwood	17,939	0	0
J. & C. Bowyer, Upper Norwood	17,550	0	0
H. Kent, Hither Green	17,497	0	0
Patman & Fotheringham, Islington	17,453	0	0
S. E. Moss & Co., Southend-on-Sea	17,380	0	0
W. Wallis, Balham	17,302	4	8
J. E. Johnson & Son, Leicester	17,176	0	0
C. Ansell, Lambeth	17,150	0	0
W. Johnson & Co., Wandsworth Common	17,081	0	0
F. & H. F. Higgs, Herne Hill	16,994	0	0
W. Lawrence & Son, Waltham Cross	16,984	0	0
E. Lawrance & Sons, London, N.	16,972	0	0
G. Godson & Sons, Kilburn	16,883	0	0
Holliday & Greenwood, Brixton	16,876	0	0
Kirk & Randall, Woolwich	16,822	0	0
F. G. Minter, Putney	16,592	0	0
G. E. Wallis & Sons, Maidstone	16,498	0	0
Cropley Brothers, Epsom	16,447	0	0
C. Wall, Ltd.,* 4, Lloyds Avenue, E.C.	16,381	0	0

* Recommended for acceptance.

New Malden (Surrey).—For the erection of new Council school, for the Surrey Education Committee. Messrs. A. W. Jarvis, A.R.I.B.A., and F. A. Richards, M.A., 36, Victoria Street, London, S.W., architects to the Surrey Education Committee :—

J. Schofield	£9,249	0	0
Tribe & Robinson	8,082	0	0
Mitchell Brothers	8,001	0	0
J. Marsland	7,607	0	0
T. Holloway	7,363	0	0
G. Kemp	7,228	0	0
Cummins & Son	7,150	0	0
J. Goddard	7,046	0	0
J. & M. Patrick	6,850	0	0
Martin, Wells & Co.	6,778	0	0
W. Smith & Sons	6,743	0	0
T. J. Hawkins & Co.,*	6,691	7	3

* Accepted.

Taff's Well (near Cardiff).—For the construction of boundary walls, roads, and drainage, and other contingent works for proposed cemetery, for the Caerphilly Urban District Council. Mr. A. O. Harpur, surveyor :—

T. F. Howells & Co., Cardiff	£2,870	1	11
E. Powell, Whitchurch, near Cardiff	2,959	14	6
J. B. Mundy, Taff's Well	2,680	11	0
E. Osmond & Sons, Ely, Cardiff	2,755	0	9
Hatherly & Co., Penarth	2,914	9	4
Barnes, Chaplin & Co., Cardiff	2,834	15	10
R. Macnab, Newport, Mon	2,845	12	4
T. Rossiter, Caerphilly	2,335	18	6
G. L. Morgan, Pontypridd	2,547	8	2
J. Allen & Co., Cardiff	3,148	19	0
E. Williams, Whitchurch, near Cardiff	2,661	12	10
A. J. Rossiter, Caerphilly	2,417	4	8
T. Edwards,* Taff's Well	2,369	4	3

* Accepted.

Barnes.—For wood-block paving Castelnau, Barnes, for the Urban District Council Mr. G. B. Tomes, A.M.I.C.E., surveyor, Mortlake :—

				Months.				Months.
Rowlingsons & Co., Chancery Lane, W.C.	£16,448	10	0	6	£18.048	0	0	4
Shepherd & Sons, Teddington	16,022	14	0	6	16,022	14	0	4
Underwood Bros., Dukinfield	15,556	5	0	6	15,800	0	0	3
P. A. Amy, Westminster	15,547	15	0	6	19,500	0	0	4
Parry & Co., Putney	15,519	4	6	6	18,500	0	0	2
Wimpey & Co., Hammersmith	15,122	10	0	6	15,372	10	0	5
Griffiths & Co., London, E.C.	15,075	0	0	6	15,803	0	0	4
H. Hemming, Clapham Junction	15,045	5	0	6	15,295	5	0	1½
Mowlem & Co., Westminster	14.987	0	0	6	14,987	0	0	4
Kavanagh & Co., Surbiton Hill	14.865	17	6	6	15,365	0	0	4½
P. Smith, Kilburn	14,643	16	8	6	14,643	16	8	4½
Millar's Karri & Jarrah Co., London, E.C.	14,590	10	0	6	14,590	10	0	4
G. J. Anderson, Poplar	14,315	12	0	6	14,500	0	0	4
Fry Bros., Greenwich	13,878	2	6	6	—			—
Acme Flooring & Paving Co., Victoria Park, N.E.	13,699	12	8	6	14,184	12	8	2
T. C. Starkey, Hull	13,059	17	10	6	14,434	1	2	4
Improved Wood Pavement Co.,* 46, Queen Victoria Street	13,124	5	0	6	13,366	15	0	4

* Accepted.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
January 16, 1907.
FIRE SUPPLEMENT (MONTHLY).
Vol. XXV, No. 623. 6, Great New Street, Fetter Lane, London, E.C.

THE YEAR 1906 FROM THE FIRE POINT OF VIEW.

The year 1906 can scarcely be said to have been noteworthy in the annals of fire protection, but it has been a very remarkable twelve months for great fire losses.

Whilst 1905 was notable for much appertaining to fire prevention and protection of loss of life in particular, and great activity was displayed in many directions with a view to furthering the interests of better protective measures, it can scarcely be said that there was anything that called for very special attention in 1906; in fact, with one or two exceptions, the whole propagation of fire prevention would almost appear to have "marked time" during the past twelve months, perhaps by way of reaction after the very energetic period of the preceding year. The exception has been

the development of reinforced concrete construction

in this country, as a means of affording protection from fire—*i.e.*, its introduction into the great warehouses and manufacturing industries specifically as a fire-resistant; and with its introduction there was much in the way of fire tests (notably those of the British Fire Prevention Committee) which calls for comment. For instance, during 1906 the first systematic tests with reinforced concrete that have ever been conducted were carried out at the Committee's Testing Station at Regent's Park, with such well-known systems as those of Messrs. Coignet, the Patent Indented Steel Bar Co., and the New Expanded Metal Co., and tests with other systems are in hand.

The subject of reinforced concrete as a fire-resistant was under discussion at the Architects' Congress last July, and at the International Fire Service Congress at Milan earlier in the year. Similarly it was under consideration before the National Fire Protection Association of the United States, and various tests were conducted during the year at the Columbian University Testing Station under Prof. Woolson's guidance.

Results.

The result of these varied enquiries and discussions may be considered to be embodied in the general warning that reinforced concrete construction can be only looked upon as of fire-resistive importance when the concrete aggregate has been most carefully selected, when the Portland cement used is of the very first quality, and when the metal bars are applied in such a manner that no bar shall have a lesser protection of concrete than a covering 2ins. thick.

Certain authorities have asked for this protection to be 2½ins.; the insurance companies in the United States even require as much as 3ins. and 4ins. under specific conditions; but, taking an all-round figure, probably 2ins. suffices except under very peculiar conditions. It should be understood, however, that a thickness of 2ins. is a requirement far above that which many specialists in reinforced concrete deem sufficient to accord to their clients, it being almost common practice to find as little as ½in. to ¾in. below the floor panel.

Concrete Aggregates.

As to concrete aggregates, the sizes of the aggregates have been proved to be a most important factor, and the concensus of opinion is between an aggregate that will pass through a ¾-in. mesh and a 1-in. mesh. In regard to the actual materials to be used for the aggregate, there is considerable divergence of opinion except on one point—namely, that opinion is practically unanimous that Thames ballast, so frequently used in the Metropolis, is practically the worst aggregate for fire-resisting purposes. A very careful enquiry into this matter has been arranged for this year, so that a step in advance may be expected before 1907 closes.

Another matter that has stood out in a somewhat uninteresting year has been the attention accorded to the subject of

the protection of window and door openings.

Whilst attention has been centred on the separation of fire risks horizontally, the vertical opening has been almost neglected, and it is only of late that proper attention appears to have been accorded to this very important subject, papers read at Milan and at Birmingham by Mr. Ellis Marsland, district surveyor of Camberwell, having in particular done much towards directing attention to the matter. The United States is already well alive to it, but the Continent seems to be entirely neglecting this side of the question.

In regard to horizontal protection, attention has been directed towards reinforced concrete, and so, for vertical protection, special forms of glazing in suitable casements and metallic shutters constructed to meet the strains of expansion and contraction have claimed chief notice.

The wire-glass tests, both here and in the United States, and the tests with roller shutters at Regent's Park, stand out as important investigations on this particular point of vertical protection.

Legislation.

In the matter of legislation there is little to report so far as fire protection is concerned, beyond the fact that the Building Act Amendment Act of 1905 came partially into operation during 1906, and that another important part, as mentioned elsewhere, has just come into operation. The part which has already come into force has shown, however, that it would have been better, probably less irritating to the building owner, and more economical all round, if the entire executive had been left in the capable hands of the district surveyors. Centralization at Spring Gardens has not met with general approval, and should the present *régime* be changed it may be anticipated that something will be done to decentralize where centralization now exists in excess.

In London a great amount of additional work has been thrown on the district surveyor, and also upon certain departments of the London County Council and the Fire Brigade, and those who are all too ready to condemn the work of others may at least have the knowledge that the work in question has been of an extraordinary character.

Fires of the Year.

With regard to fires during 1906, of course the year will always stand out as a somewhat notable one owing to the great fires of San Francisco and Valparaiso; indeed the terrible conflagration at San Francisco will probably go down to posterity for many centuries as one of the most terrible events of this period. But, however sad the catastrophe, there is one splendid feature of which every Englishman should be proud—namely, that every one of the British insurance companies—which bore a considerable proportion of the San Francisco risks—promptly and mostly very courteously met their legal obligations without a single failure. Quite a number of the American insurance companies failed, whilst among Continental companies many played the despicable *rôle* of denying liabilities.

In this country the most notable fire occurred in July at the whisky bonds of Messrs. James Watson & Co., at Dundee (illustrated in our supplement), when property to the value of £459,000 was destroyed. There can be no doubt that the class of fire-hazard known as whisky bonds is a particularly dangerous one, and greater sub-division of a reliable kind is absolutely essential.

The printing works fire of the Calico Printers' Association at Rawtenstall caused a loss of £72,000; the fire at the print works of Messrs. Scott & Co. near Littleborough resulted in a loss of £21,000; and there were quite a number of other minor fires in print works.

Of drapers' establishments, the King and Heywood fire at Liverpool meant a loss of £25,000, and there were several notable drapers' shop fires in which the loss varied between £12,000 and £25,000.

Of boot factory fires there was one at Messrs. Derham Brothers at Bristol, with a loss of £62,000, and one at Hackney with a loss of £7,000.

There were comparatively few warehouse fires, and this may be attributed, as far as Liverpool is concerned, to the excellent supervision of the Liverpool Salvage Corps, as also to better construction generally.

The losses at textile mills totalled £70,000, spread over five fires—one being a cotton mill that was sprinklered.

The fire at the engineering works at Glasgow belonging to the Caledonian Railway caused a loss of £7,000.

A very curious fire was that of Messrs. Hotham & Whiting at Leeds, where the fire actually spread across a street 57ft. wide and attacked the Great Northern Hotel, the total loss being £90,000. No insurance surveyor, much less a building surveyor, would consider the risk of spread a serious matter where there was a 57-ft. thoroughfare intervening.

As to church fires, there was of course the notable Selby Abbey fire, where a loss of about £50,000 was sustained, the insurance only being £11,000. There was also the fire at Christ Church, Mayfair.

Country-house fires continued to be a serious feature of the year, some splendid old places being destroyed—such as Denton Manor, Lincs., where the loss was £28,000; "Tynmawr" at Gilwern, £27,000; Newton House, Cyres; Rodbury Manor, Stroud; and Eccles Castle, Surrey.

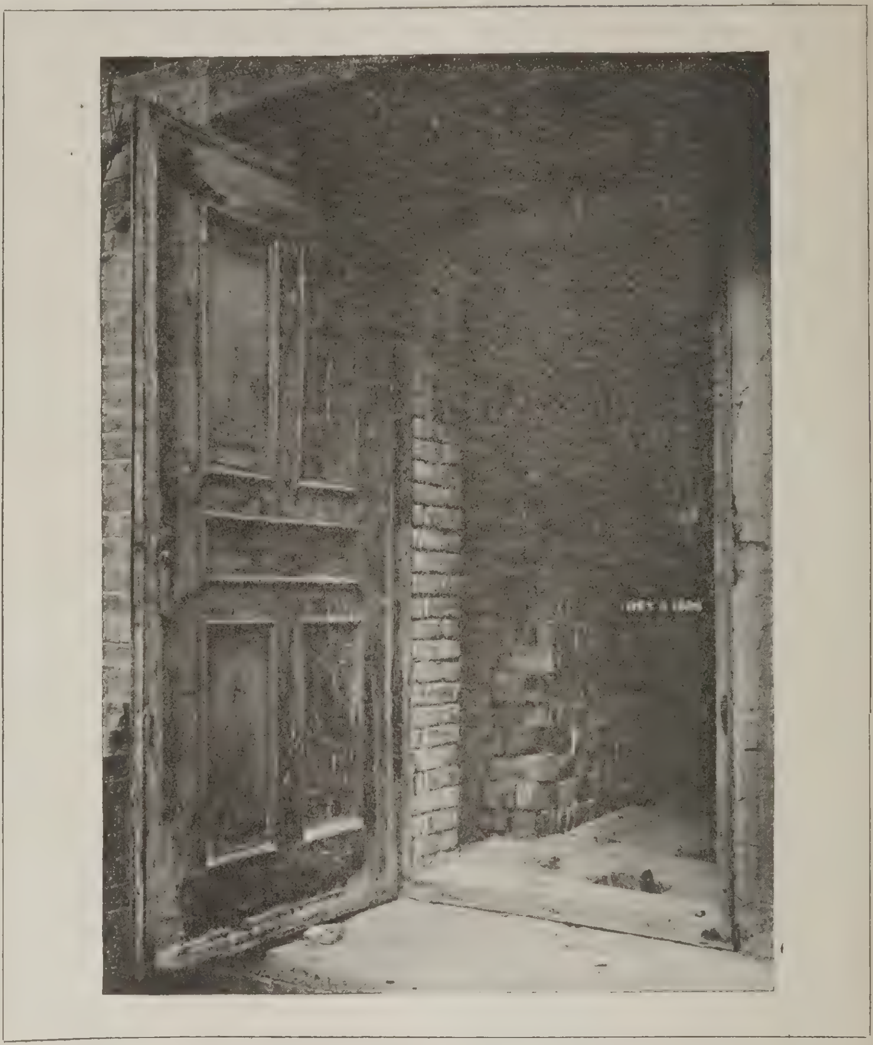
Of public buildings there was the fire at the Merchant Venturers' College, Bristol (illustrated in our supplement), involving a loss of £5,000; the public hall at Nottingham; Council school at Walthamstow; and a workhouse at Carmarthen.

Abroad, in addition to the great conflagrations at San Francisco and Valparaiso, there were the Hamburg fire (illustrated in our supplement), the big fire at Wellington, New Zealand, and fairly large fires at Bremen, in Germany, at Bordeaux, and at the Paris Leather Market.

London Fires.

The number of fires in London during 1906 was 3,271, as compared with 3,511 in 1905. The greatest number of fires in any one week was 98, and the least 41. The feature of the year was the large number of cases in which children lost their lives, in many before the firemen received any intimation of the fire. In round figures 110 persons were burned to death during the year, of whom the majority were children, and 66 of these died before admission to hospital.

Among the London fires were the following:—Cap factory in Commercial Road, Whitechapel; Christ Church, Down Street, Piccadilly; blouse factory in Bayer Street, E.C.; spring-blind factory in Old Street, E.C.; seed-crushing mills, Cubitt Town; organ works, Chalk Farm; golf implement factory, Farringdon Road; timber yard, Westminster Bridge Road; chemical food factory, Bethnal Green; timber yard, Clapham.



DOOR No. 1 AFTER THE TEST (OUTSIDE).

FIRE TESTS WITH DOORS.

In the course of the last few years the British Fire Prevention Committee has tested about 30 different doors of various materials and of different forms of construction, and a very fair idea has been thereby obtained of the relative fire-resistance of the protective coverings to door openings.

Of late there has been a tendency on the part of specialist contractors to design composite doors, and one of these was recently under test at the Committee's station. It is of German origin, used extensively in the South of Germany, and was put forward in this country by Messrs. T. Houghton & Co.

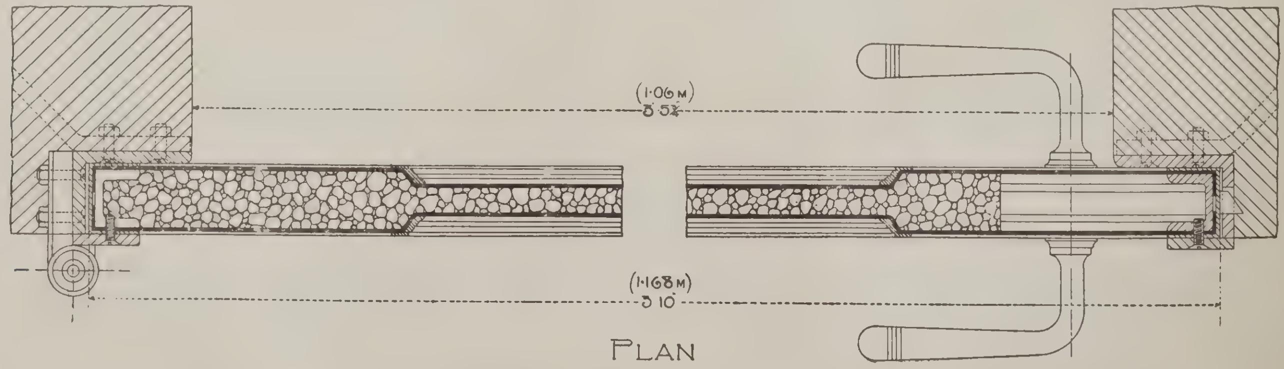
In the prefatory note to the report on the test, just issued, Mr. Max Clarke, the Directing Member, states that "these particular doors—and there were two of them—came out on testing as well as many other doors which are dubbed with the title 'fireproof.'"

With this opinion we entirely concur, and the opinion calls for attention, having regard to the fact that neither of these doors obtained the classification of being "Fully Protective" (Class A) as aspired to by the testers.

Of the two doors under test, one was a panel door and one was designed to appear like a ledged door.

The Summary of Test states that, in the case of the panel door, after five minutes the panels of the door bulged, and after two hours flame came out between the door and the frame, and the classification of "Fully Protective" (Class A) was not obtained.

To obtain classification of "Fully Protective" (Class A) would have necessi-



SECTIONAL PLAN OF DOOR No. 1.

tated the door withstanding fire for two and a-half hours without any flame passing through.

In the case of the second door, which appeared like a ledged door, flames already came out after thirty minutes between door and frame; nevertheless, the principles of construction adopted seem to be right, though certainly capable of improvement, and with that improvement these doors should become most useful, for they have all the elements in them for making a thoroughly fire-resisting door, when properly constructed in detail and properly hung.

It should be remembered that in one of our earliest Fire Supplements we showed a door from an actual fire at Glasgow which was a composite door—*i.e.*, of steel frame and concrete—and this stood a very severe fire remarkably well. In the present case of the Houghton door the filling is not concrete but an asbestic composition, so that, if anything, even better fire-resistance should be obtainable.

The accompanying illustrations show what the doors actually looked like after the fire, although the flame had got through the points indicated. The following detailed description of the doors shows how each withstood the test :—

PANEL DOOR (No. 1).

Outside.

The door was open and could not be shut owing to its having dropped at the bottom.

The whole of the face is buckled and bulged, but not broken in any way.

The edge of the door is almost flat all round except for a slight curve inwards at the centre of the top rail.

The exterior lock-plate and handle are uninjured; the handle will move the centre bolt, but will not actuate the vertical top and bottom bolts.

The top corner at the hinge side (north) is away from the frame owing to the frame being bent as described in notes on the inside.

Inside.

The whole of the panels are buckled or bulged, and also the whole of the face forming the stiles and rails round the panels. The greatest amount of deflection in the panels is $\frac{1}{2}$in. (·0127m.). The greatest amount of deflection in stiles and rails is at top corner by hinge (north), which is 1in. (·0254m.).

The mouldings are very slightly curved, $\frac{3}{16}$in. (·0047m.) being the greatest deflection.

The whole of the inside face of the iron, including the mouldings, is scaled all over, the iron coming off in a flake about $\frac{1}{32}$in. (·00077m.) thick, that off the mouldings being rather thicker.

The frame is bulged outwards at the level of the top hinge, allowing the hinge and the top corner of the door to come out of the frame $\frac{3}{8}$in. (·0095m.).

The lock-plate is loose, the screws fixing it are gone, but it is held in position by the spindle, which goes through the door; the handle is broken off.

"LEDGED" DOOR (No. 2).

Outside.

The door was open and could not be shut owing to its having dropped at the bottom.

The face of the door is buckled and bulged, the greatest deflection being 2ins. (·0508m.). The surface is not damaged otherwise.

The iron covering to the edge of the door has bulged out from the face of the plates, the greatest deflection being $\frac{1}{8}$in. (·0031m.) between the rivets, of which there are four along the top.

The exterior lock-plate and handle are on the door; the handle will move the centre bolt but will not actuate the vertical top and bottom bolts.

Inside.

The door is considerably buckled and bulged all over, the greatest amount of deflection being 2ins. (·0508m.).

The inside face of the iron is scaled all over, the iron coming off in a flake about $\frac{1}{32}$in. (·00077m.) thick.

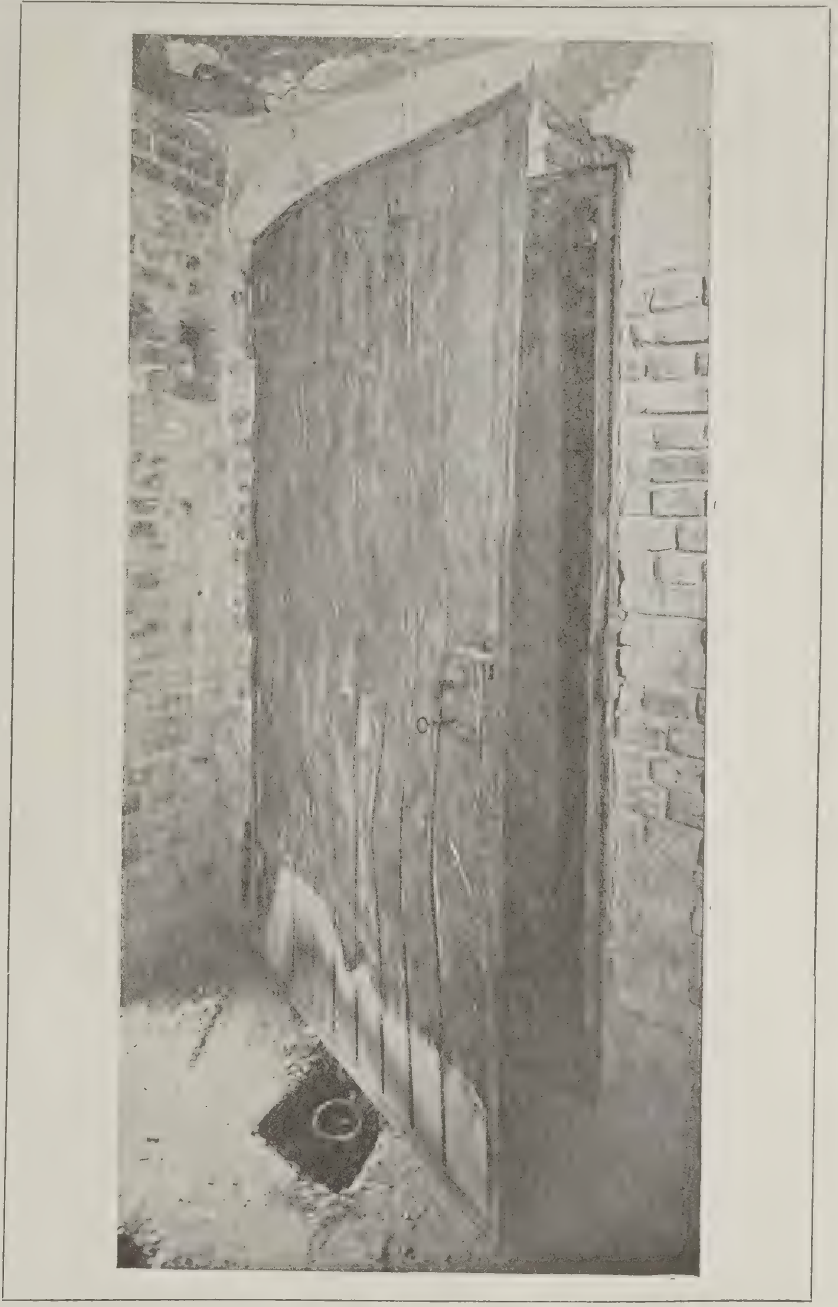
The top of the door has a regular curve inwards, it being $1\frac{7}{8}$ins. (·0476m.) inwards in the centre.

The sides are curved inwards from top to bottom; greatest deflection $1\frac{1}{4}$ins. (·0317m.) at the level of the lock (north) side. This is due to the cramp or dog-iron which goes into the brickwork bursting the brickwork inwards, and allowing the frame to become curved away from the small reveal in which the angle frame is fixed.

The frame on the hinge side (south) is also curved inwards, but only $\frac{3}{8}$in. (·0095m.).

The lock and handle are still on the door.

The iron covering to the edge of the door on the inside face is bulged away from the face of the door between the screws which fasten it on. Worst above and below centre hinge. Greatest bulge $\frac{1}{2}$in. (·0127m.).



DOOR NO. 2 AFTER TEST (INSIDE).

As the construction is of particular interest, we give the following detailed description of the panel door :—

DOOR No. 1.

Size of door—3ft. 10ins. (1·168m.) wide, 7ft. 7ins. (2·311m.) high. The door is constructed with a channel frame of iron, 1in. by $1\frac{1}{8}$ins. by $\frac{1}{4}$in. thick (·0254m. by ·0285m. by ·0063m.). The sheets of iron forming the inside and outside faces are $\frac{1}{16}$in. (·0015m.) thick, having the portions forming the panels pressed or stamped inwards by hydraulic pressure. The sheets are turned over at the edges and secured to the channel frame with screws.

Covering the edges of the door, and projecting over each face 1in. (·0254m.), a channel-shaped piece of sheet iron, $\frac{1}{16}$in. thick (·0015m.), is screwed on at the edge, and riveted through the thickness of the door.

On the outside face of the door a strip of iron $1\frac{3}{8}$ins. by $\frac{1}{4}$in. (·0349m. by ·0063m.) is screwed on all round the edge, projecting beyond the edge of the door $\frac{1}{4}$in. (·0063m.), forming an external cover to the angle frame. The panels are riveted together. The door is $1\frac{3}{8}$ins. (·0349m.) thick in stiles and rails, and $\frac{5}{8}$in. (·0158m.) in the panels. The mouldings are drawn iron, riveted on and mitred at the angles. The lock is of the Continental mortice type, with lever handles inside and out, and the spindle actuates a bolt in the lock, going into the frame to about the centre of its height, and also moving two vertical bolts engaging the top and bottom portions of the frame. All the bolts are splayed, so that the door can be shut by slamming. There is also a key actuating a dead-lock arrangement. The space between the two sheets of iron is stated by the maker to be filled with asbestic composition.

The frame is of angle iron, $2\frac{1}{2}$ins. by $1\frac{5}{8}$ins. by $\frac{1}{4}$-in. thick (·0635m. by ·0412m. by ·0063m.), with plates $\frac{1}{4}$in. thick (·0063m.) mitred and screwed on at each angle. The frame is secured to the brickwork with iron cramps or dog-irons, two at the top, two at the bottom, and five at each side, made of 2-in. by $\frac{1}{4}$-in. iron (·0508m. by ·0063m.) secured to the frame, each with two $\frac{3}{16}$-in. (·0047m.) bolts, having countersunk heads, the dog-irons being about 9ins. (·2286m.) long, caulked into the brick wall; the frame is fixed in a small reveal in the brickwork and pointed all round on both sides with mortar.

The hinges are the usual Continental type of projecting butt pivot hinges, with long points top and bottom, bolted to the door and frame.

There are no joints on either faces of the door.

FORTHCOMING TESTS.

Among the arrangements announced by the British Fire Prevention Committee for the early part of this year are two further tests with reinforced concrete floors, one of which—known as the Herbst type—might be more aptly described as a hollow reinforced concrete floor or composite floor, comprising a number of light beams of concrete reinforced by metal of special section, the beams holding hollow concrete blocks which can be moulded on the job. The dates for the tests have not yet been fixed.

It is also of interest to note that the first of the loading tests undertaken by the Committee will also take place early this year. It should certainly be an important and useful addition to the Committee's work to be able to report not only on the fire-resistance but also on the carrying powers of different types of floors.

MEANS OF ESCAPE FROM FIRE.

Summary of the New Act.

As is generally known, the new regulations as to means of escape in case of fire came into force on January 1st under the London Building Acts (Amendment) Act. It is opportune just now, therefore, to set down the scope of the important changes that are effected by these additional powers of the London County Council.

The London Building Act of 1894 contained very little in regard to this matter, and such provisions as were provided applied only to buildings which were new at the passing of that Act. Proper means of access to the roof were required in buildings exceeding 30ft. in height, having a parapet, and used wholly or in part as a dwelling-house or factory.

The Act of 1894 also required reasonable means of escape in case of fire in new buildings exceeding 60ft. in height.

The London Building Act Amendment Act of 1898 made no provision for means of escape in case of fire, and it was not until 1905 that the legislature saw fit to make more special regulations in this particular. Although the rights of interference with private property which are conferred by this measure upon the London County Council may appear to be drastic, they are no more arbitrary than the provisions of the Factory Act, 1901.

There is first of all the question as to

what buildings are affected.

The section relating to this states that the Act applies to any building existing on January 1st, 1907, which is (a) a high building, or (b) a building in which sleeping accommodation is provided for more than 20 persons, or which is occupied by more than 20 persons, or in which more than 20 persons are employed.

The expression "high building" means any building which has a storey 50ft. above the footway; "existing building" means any building not being a new building; while "new building" means "any building the actual erection of which above the footings was not *bona fide* commenced at the commencement of the Act—*i.e.*, on January 1st, 1906, or (i.) which was taken down, burnt, or destroyed for more than one-half its cubical extent, and re-erected or commenced to be re-erected after January 1st, 1906; or (ii.) of which the cubical extent has been increased after such date by an amount equal to the cubical extent of the building as existing before such increase, and any existing building which by reason of any alteration thereof, or addition thereto, becomes a high building after such date.

As to (b), above, the expression "buildings in which sleeping accommodation is provided for more than 20 persons" would, of course, include hotels, boarding-houses and lodging-houses, but not dwelling-houses occupied by not more than one family, such buildings being expressly excluded by another part of this section of the Act. As to whether flats are included in the section, that is a question which is bound to come up for consideration sooner or later. A block of flats is generally a "high" building, and the Council may require that means of escape from the upper storey shall be provided.

The owner of the building is defined as the person for the time being receiving the rack rent of the premises, and it follows, therefore, that the cost of carrying out the requirements of the London County Council will not fall on the tenant, but on the landlord.

Extent of the Requirements.

The new Act authorises the Council to call for "the provision of such means of escape as can be reasonably required under the circumstances of the case."

It is apprehended that under this provision an owner might be required to put up an iron staircase outside his house if there were only one wooden staircase connecting the floors on the inside. It is material to observe, however, in this connection that the powers of the Council are not limited to high buildings. If the Council find that a large number of people are huddled together, they may exercise the powers conferred by the Act in order to secure their safety. There is little fear, however, that the Council will exercise their powers harshly, or impose any very grievous burden upon those whose buildings cannot, except at enormous cost, be provided with modern means of escape in case of fire. If the owner can make a trap door in the roof, or enter into some arrangement with a next-door neighbour by which advantage can be taken of adjoining balconies in cases of emergency, it is probable that the County Council will be satisfied. It may be pointed out, moreover, in this connection that the Act provides that if an owner has received notice of the requirements of the Council, he may suggest an alternative scheme which the Council may accept, if it meet the necessities of the case. (Extracts from "Engineering.")

FIRE-ESCAPE STAIRCASES.

The London Building Act has required the provision of fire-escape staircases for some years past. By reason of the Amendment Act, however (dealt with on this page), the subject is bound to attract more attention from architects.

With the ordinary external staircase we are not for the moment concerned. We limit the subject to external fire-escape staircases which have to be provided to existing buildings where no other means of escape are afforded. These external staircases have come into being in order to meet the necessity of economy in alterations to existing buildings. In constructing a new building an architect would generally endeavour to shut off the service staircases so as to make them suitable for means of escape in case of fire, and he would do away with the necessity for an external staircase, as well as securing a better appearance. But the question of economy may lead even then to the provision of external staircases as a means of escape. For instance, the large new block of offices in Tothill Street, Westminster—Caxton House—has an external staircase which is not a very beautiful affair, but which will be hidden when the adjoining building is erected.

Various forms of external fire-escape staircases have been adopted from time to time. Perhaps the earliest efforts were made in America, and Figs. 1, 2 and 3, taken from a paper read by Mr. Charles A. Daubney before the Royal Institute of British Architects some years ago, illustrate early types which are still to be found in America and in this country; consisting of a vertical iron ladder with or without balconies in conjunction. Fig. 1 is the earliest form, but has been passed over as unsuitable. It has only one upright to take the rungs, and access is obtained from adjoining windows by means of small pierced-iron landings. Such a means of escape would be impossible of descent except by athletic persons, and it is quite unsuitable for situations where women, aged persons, or even those who are untrained in its use, would be called upon to avail themselves of it. Fig. 2 is a slight improvement, two uprights being provided, with a small balcony at each opening. Fig. 3 is a modification of this second type. In both access to the ladder is obtained from these balconies by small manholes in the floor.

The next form of escape to come into adoption was the circular corkscrew staircase communicating with balcony landings similar to those referred to above, such as shown in Fig. 4. This was a considerable improvement upon the ladder escape, but in the ladder and the corkscrew staircase form there would be great danger in case of panic. The ladder is, of course, very much worse than the circular staircase, but in the latter the congestion from the hesitancy which persons would have to descending by such means, and the rush of those behind, would cause it to become choked quickly with people if there were many trying to escape at the same time, with the result that persons would be pushed off, thrown down and trampled upon, or prevented

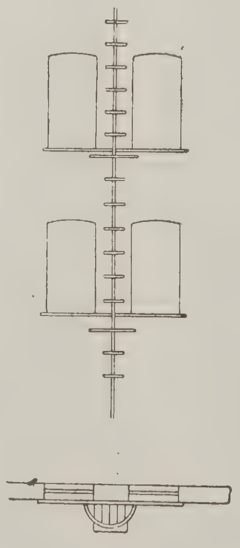


FIG 1.

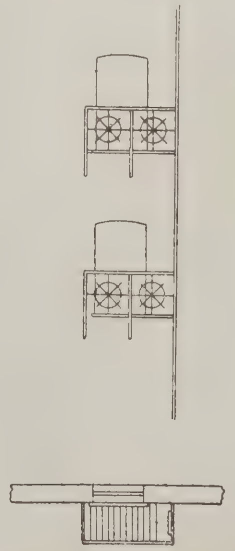


FIG. 2.

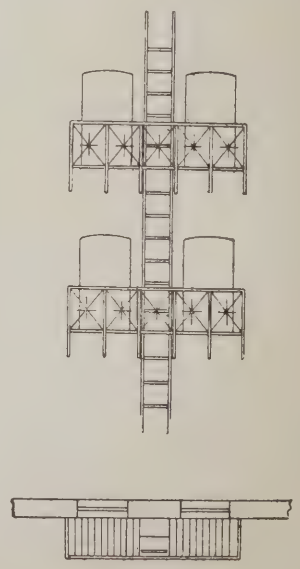


FIG. 3.

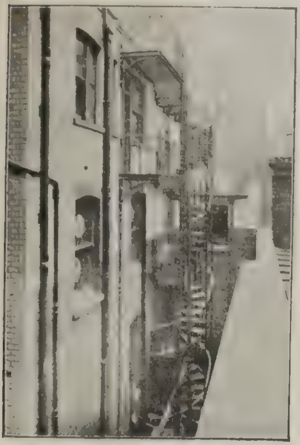


Fig. 4.—Spiral Staircase, Hayhill Lodge London, W.

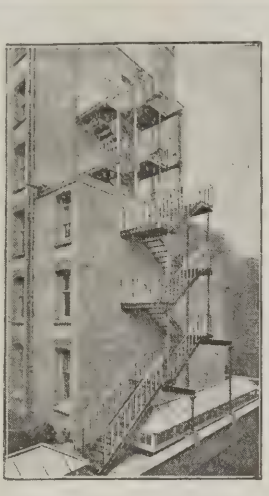


Fig. 5.—Fire-escape Staircase, Waverley Hotel, Bloomsbury.

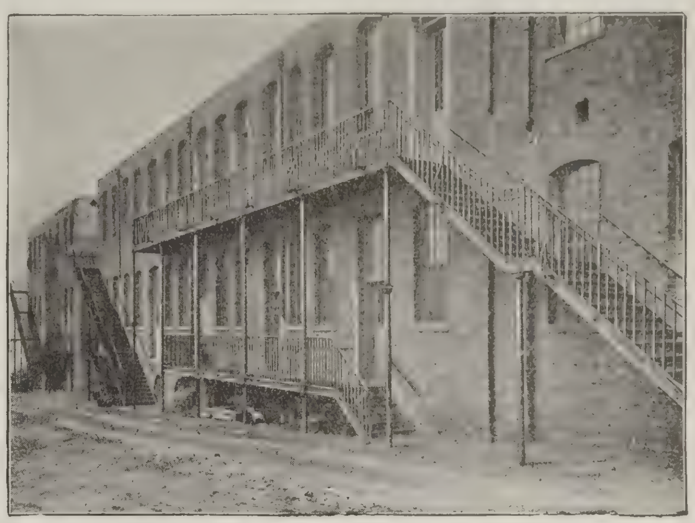


Fig. 7.—Staircase, Welsbach Factory, Wandsworth.

from passing down the staircase, and they might thus be caught by the fire or suffocated by the smoke.

A further progessive step was taken by the New York Estate Department of Labour, when they suggested the provision of the staircase shown in Fig. 5. The treads again were of round iron rungs similar to a ladder, but they provided much easier going. In this case balconies not less than 6ft. long and 3ft. wide, and communicating with two windows, were provided at each floor. Where it was not deemed advisable that the external staircase should communicate with the ground—to prevent undesirable persons interfering with or using it—the staircase was stopped at first-floor level, and the last descent consisted of a loose ladder, suspended from the landing above when not in use (see Fig. 5). This staircase was extremely light in construction.

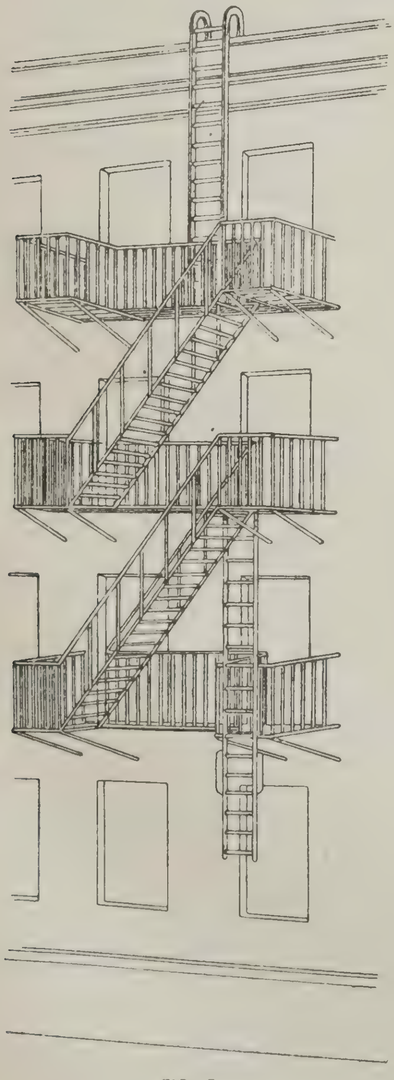


FIG. 5.

We now come to the modern type of external staircase as required by the London County Council. (The Council, be it noted, do not trouble themselves with considerations of expense. The type they adopt, however, is generally recognised as a standard, modified more or less in other districts.)

In the London type the staircase is 3ft. 6ins. wide, in short flights with landings; the latter often becoming extended into balconies communicating with numerous openings if necessity requires. Handrails have to be provided on both sides. The supports of the staircase are required to bear directly one on the other down to the ground; it is not permissible to support the staircase from the walls only. This particular requirement differentiates the English type of fire-escape staircase from that of New York. Fig. 5, for instance, shows the American staircase supported from the walls, and Fig. 6 is an English example of what is done outside the jurisdiction of the L.C.C. Support apart from the walls, however, seems a needless requirement, because an external staircase would not be passable after the fire had got a hold on the premises sufficient to weaken the walls; in fact, it may generally be taken that occupants must escape within the first ten minutes of a fire, otherwise smoke and flame from the openings will prevent them using the staircase, whereas no outer wall is affected until the very end of the conflagration. It seems unwise, also, to require these staircases to be of excessively strong construction, because this only incurs needless expense.

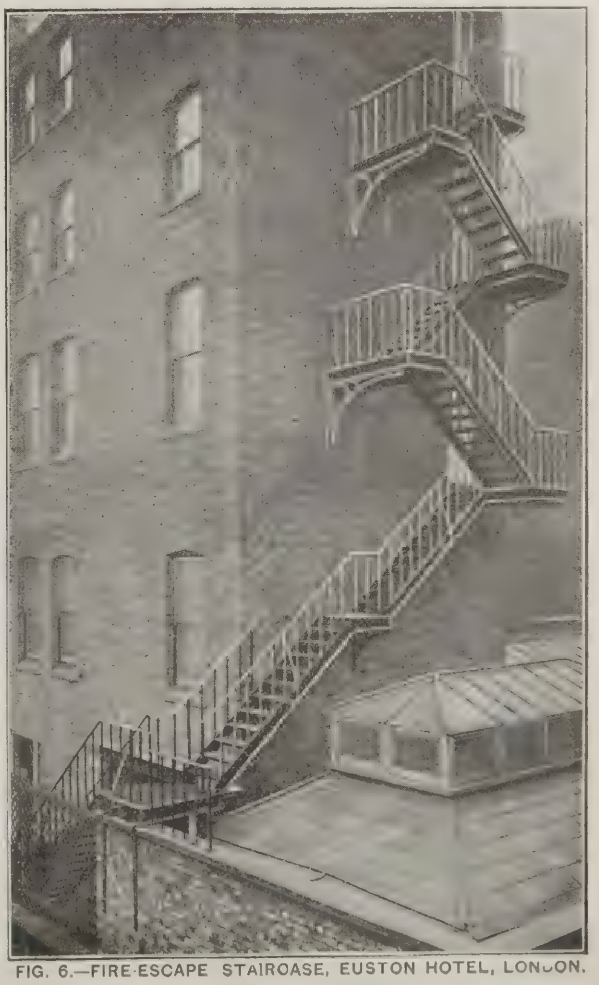


FIG. 6.—FIRE-ESCAPE STAIROASE, EUSTON HOTEL, LONDON.

The staircase may or may not run right down to the ground. In public institutions standing in their own grounds, where the possible interference of the public can be prevented, it is customary to carry staircases down to the ground, but the London County Council requires all staircases to go down to the ground whether on a public thoroughfare or not. No doubt this is a wise precaution to take in cases where a large number of persons would require to use such means of escape, but as the new Act will extend the provision of a staircase to much smaller buildings than has been customary in the past, it would be well to consider whether this requirement should not be relaxed in some degree, because a hanging ladder for the last flight, or some folding extension, would avoid annoyance and the trouble of constant supervision.

The London County Council, too, it will be gathered from the extract from their by-laws on this page, ask for all escape staircases to have risers. We do not know exactly the reason for this. It may be that the authorities think there is danger of persons' heels catching if the risers are done away with, thus causing them to fall and to be trampled upon in case of panic, but the easy going does away with the need for this regulation. No doubt the absence of risers may lead to stumbling in ascent, but not in descent.

The width of 3ft. 6ins. insisted upon is not necessary where only a few people occupy the building; a width of 2ft. 6ins. or 2ft. is ample for one person to pass down a staircase at a time; 3ft. is often specified as a compromise, but in our opinion this width is inadvisable, as it would lead to persons attempting to pass each other on the staircase, and thereby result in over-crowding.

The provision, too, for hand-railing on the wall side is somewhat of a refinement which might also be modified.

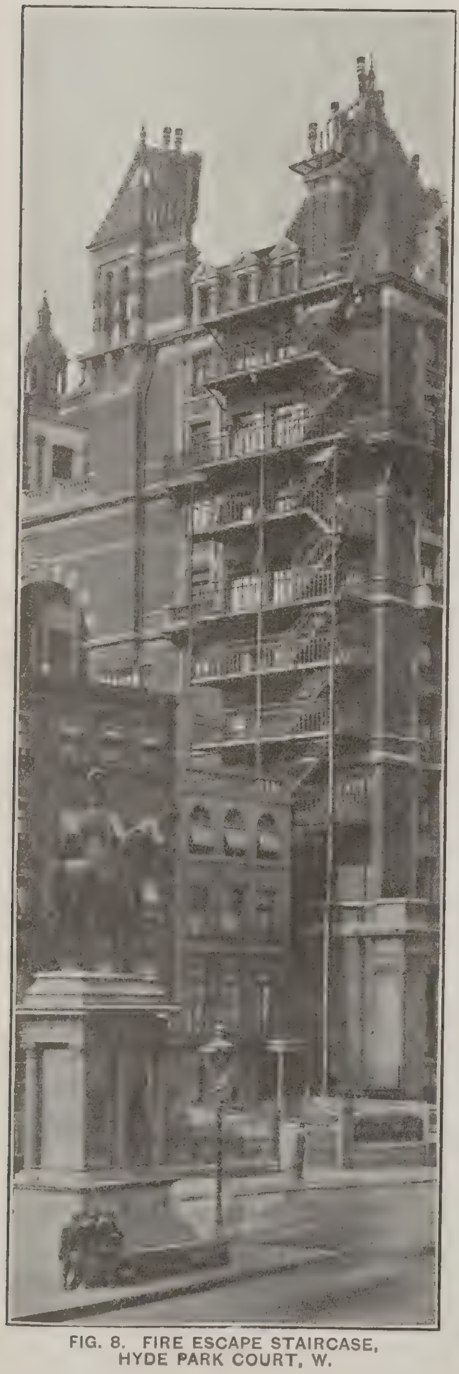


FIG. 8. FIRE ESCAPE STAIRCASE, HYDE PARK COURT, W.

The Council are also particularly keen on a pattern of cast-iron treads containing small $\frac{3}{4}$-in. square holes, which, while preventing the treads being slippery —a matter of great importance as avoiding accidents in case of panic—is certainly not superior to other forms of holes which have been provided by various makers, and, indeed, is perhaps not so good as some others. A matter of detail like this does not seem to be a legitimate subject of legislation.

The London County Council regulation as to short flights (which have led to the provision of so many staircases of what is called the "dog-leg" type) is certainly very valuable, for a fire-escape staircase is not a fireproof staircase, but only a means of allowing as many people as possible to escape quickly and safely at the commencement of a fire, and anything that conduces to an orderly continuous flow of persons is to be advocated. A long flight, if one or two persons stumble, becomes a death-trap, but a series of short flights, turning on intermediate landings, is as good as half-a-dozen policemen regulating the way.

The inelasticity of the regulations is, perhaps, unavoidable in the circumstances, but the fact that the new Act will deal with numbers of owners who are financially unable to carry out expensive schemes will probably cause some slackening of the present very rigid rules.

The London County Council requirements regarding external staircases, gangways, and balconies are as follows:—

External Iron Staircases.

(*a*) The staircases, including the strings, bearers and supports, should be of iron, and constructed throughout upon dead bearings, to the satisfaction of the district surveyor.

(*b*) The steps and landings should be constructed of solid or perforated iron plates (if perforated plates be used no perforation should exceed $\frac{3}{4}$in. across each way).

(*c*) The risers should be of iron, either solid or of a close pattern.

(*d*) Where an iron staircase is in general use the treads and landings should be finished with a surface of approved non-slippery material, as distinguished from perforated iron or chequered iron plates.

(*e*) All windows and similar openings by or near any such staircase should be glazed with fire-resisting glazing, and where necessary the sashes and frames should be fixed.

(*f*) A balustrade of a close pattern at a suitable height should be provided on each side of the flights and round the landings. If balusters be used they should not be more than 6ins. apart.

(*g*) The staircases should deliver into the outer air, at the ground level, into a public way or thoroughfare, or some large open space.

Generally as to Staircases.

Treads and Risers.

(*c*) The treads of the staircases should be not less than 10ins. wide, clear of nosings, and the risings not more than $7\frac{1}{2}$ins. high.

Handrails.

(*d*) Staircases should be provided with handrails fixed upon both sides thereof, and continued round the landings and chased into the end of newel walls where these occur.

Width of Staircases, etc.

(*e*) Where the doorways or staircases may be used as means of escape by not more than 200 persons, they should be not less than 3ft. 6ins. wide.

(*f*) Where the doorways or staircases may be used as means of escape by more than 200 persons, or by more than 100 persons on any one floor, they should be not less than 4ft. 6ins. wide.

Steps, Flights and Landings.

(*i*) Staircases should be arranged in straight flights, without winders; each flight should consist of not more than 15 steps; landings should be provided at the top and bottom of each flight; the steps and landings should be of the full width of the staircases.

Landing Spaces.

(*j*) Landing spaces not less than 2ft. 6ins. wide should be provided between the steps of the flights and the escape doorways leading to and from the staircases.

External Iron Gangways and Balconies.

Materials to be used.

(*a*) These gangways and balconies should be supported on dead bearings and be provided with solid floors of incombustible materials; if perforated iron flooring be used the perforations should not exceed $\frac{3}{4}$in. across each way.

Balustrade.

(*b*) A closed balustrade not less than 3ft. 6ins. high should be provided to these gangways and balconies.

In providing staircases, they should, of course, be placed in such a position as to be the least liable to have smoke and flame upon them, and all openings communicating thereto should be carefully guarded by means of fire-resisting doors, windows with wire-glass or electro-glazing, &c.

Figs. 4, 6, 7 and 8 illustrate various forms of staircases which have been adopted in London and other parts of the country. These views have been kindly supplied by the St. Pancras Ironwork Co., Ltd., who have made a special feature of this kind of work for many years past, and have carried out the majority of the most important fire-escape staircases. Figs. 5 and 8 show regulation types in conformity with the London County Council requirements, while Fig. 7 shows modifications of these in various details.

Figs. 6 and 7 have long continuous flights, which certainly are not so advisable as the shorter flights required by the London County Council.

Fig. 7 shows a good example of a long balcony giving access to several openings. In this respect it may be mentioned that economy could often be effected by adjoining owners providing only one staircase with balconies of greater length, thereby saving the necessity of each owner having a separate staircase. Legal authorities, of course, cannot go into such questions. They do, however, serve notices on individual owners separately, and thus it may be that one owner will be called upon to provide a staircase, while the adjoining owner does not receive notice until some considerable time after. The result is that two staircases have to be provided.

Loads.

As regards the loads for which such external fire-escape staircases should be designed, the London County Council require that stairs and balconies should be calculated for a load of $1\frac{1}{2}$cwts. per sq. ft., including the weight of the structure. This is a very ample allowance. It may be mentioned that Chicago requires the floors and balconies to be constructed either of heavy cast-iron or steel capable of carrying not less than 500lbs., while the Philadelphia requirements call for a strength of 80lbs. per ft. super. upon the balconies, and 200lbs. per tread upon the ladders. This latter is no doubt satisfactory as regards the strength of each tread, but if the whole load upon the staircase were to be taken at such a figure it would be excessive. The actual live load is very difficult to gauge, being that of a quickly-moving crowd of people. On the other hand, in many cases the number of persons employed at a given factory is much smaller than the number on which the London County Council officials base their calculations. This, at any rate, should be revised, so as to allow the cost to be reduced. A staircase should not be designed to carry a greater load than the weight of the number of people ever likely to come upon the structure.

SOME AMERICAN REGULATIONS.

The influence of the insurance interests in the United States upon modern construction, not only within the area governed by the Stars and Stripes, but also practically throughout South America, can scarcely be gauged by our engineers with their experience of the methods of British insurance companies, who, however successful financially, can scarcely be said to be in the van of progress as regards propagating modern methods of construction.

As an instance of how eminently useful the insurance question can be, we reproduce herewith a number of rules governing various classes of buildings which have been framed by insurance interests in the United States, and which may well call for attention here as being applicable in the main to our own requirements.

From among the various rules published we have selected those relating to slow-burning or mill construction; next, those relating to the alteration of buildings of inferior or faulty construction; and we present similar particulars as to the standards for heat, light and fire for the all-important automatic lift traps, for automatic traps, trapdoors and stairways, and for stairway enclosures generally.

All of these should prove interesting reading to those who take a true interest in fire prevention, but they should be of particular value to the borough surveyor and his assistants, who so often have to use their discretion in matters appertaining to the safety of buildings.

CLASS A.—SLOW-BURNING OR "MILL" CONSTRUCTION.

Outside Walls.

a. To be of good hard-burned brick laid in best of lime or lime and cement mortar. All exposed walls to be carried at least 36ins. above roof, and provided with a durable coping.

b. BEARING WALLS.—To be not less than 12ins. thick for top storey and increased 4ins. for each additional storey or fraction thereof (or to be of an equivalent average thickness), the ledges thus formed acting as supports for the floor timbers and where timbers enter walls they shall rest on iron plates and be self-releasing.

If walls are of pier construction, piers to be well laid and flushed up full with cement and graded in size according to weights to be carried, but not less than 20ins. thick for the upper two storeys, increasing 4ins. for each storey below and graded in width of face according to span of bays, the face of pier to measure not less than ¼ as much as the space between centres. Walls between piers to be not less than 12ins. thick.

c. NON-BEARING WALLS.—To be not less than 12ins. thick for the three upper storeys, 16ins. thick for the next three lower storeys and 20ins. thick for the storeys below.

d. Where walls are over 100ft. in length they shall be 4ins. thicker than the above rules require for bearing or non-bearing walls, or they shall be strengthened by piers or pilasters located not over 20ft. apart.

Cut-off, Division or Party Walls.

NOTE.—A wall of this nature may be called upon to stop the spread of fire from one section of building to an adjoining section. It may, therefore, be subjected to severe heat as well as abnormal strain or shock caused by falling timbers, machinery, &c. Such a wall should be exceptionally thick, strong and well constructed. It is, therefore, recommended that all such walls be made 4ins. thicker than the rules given below require.

a. To be 3 to 5ft. parapet, projecting to cut-off cornice; metal roofing must not be carried over fire walls, and a durable coping to be provided. Special provision to be made regarding parapeting where monitors or roof lanterns are near cut-off walls.

b. BEARING WALLS.—To be not less than 16ins. thick for the two upper storeys, and to be increased in thickness 4ins. for each additional storey or fraction thereof (or to be of an equivalent average thickness), the ledges thus formed acting as supports for the floor timbers, and where timbers enter walls they shall rest on iron plates and be self-releasing.

If walls are of pier construction, piers to be well laid and flushed up full with cement and graded in size according to weights to be carried, but not less than 20ins. thick for the two upper storeys, increasing 4ins. for each storey below, and graded in width of face according to span of bays, the face of pier to measure not less than ¼ as much as the space between centres. Walls between piers to be not less than 12ins. thick.

c. NON-BEARING WALLS.—To be not less than 16ins. thick for the three upper storeys, 20ins. thick for the next three lower storeys, and 24ins. thick for storeys below.

d. Where walls are over 60ft. in length they shall be 4ins. thicker than the above rules require for bearing or non-bearing walls, or they shall be strengthened by piers or pilasters located not over 20ft. apart.

e. Where wood beams enter walls at opposite sides there must be at least 8ins. of brickwork between ends of beams.

f. All door openings to be protected by standard automatic fire doors (sliding doors preferred) on each side of the wall. Doors to be kept closed when not in use. All openings such as shafts, belts, blower pipes, &c., to be avoided, and where present, to be protected in an approved manner by standard shutters, automatic dampers or similar devices.

g. If buildings are of wood, cut-off wall to extend at least 5ft. beyond side of building, and the brick wall to be extended along or parallel to sides of building at right angles to the cut-off wall for a distance of at least 5ft. in each direction

h. Where main cut-off brick sections adjoin so as to form an angle, the two angle walls to be treated as exposed walls for a distance of at least 30ft. from the corner, that is, all windows or other openings to be bricked up or protected in a standard manner. When minor sections such as boiler or engine houses adjoin, the above rule need apply to main sections of building only.

Roofs.

To be not less than 3-in. splined plank. Roof timbers (preferably heavy single stick) to be not less than 6ins. either dimension. Covering to be of metal, gravel or approved composition.

Cornice.

To be of brick or of incombustible material. If of metal in no wise to communicate with, or shield a space communicating with, the roof timbers.

Floors.

a. To be solid and without openings.

b. To be not less than 3-in. splined plank, covered with 1-in. dressed flooring (preferably laid diagonally), and with two thicknesses of carefully laid approved waterproof material between floors, this material to be flashed at least 3ins. at the walls and around all columns and openings with moulding or mopboard. Floor timbers (preferably heavy single stick) to be suitable for the load carried, but in no case less than 8ins. either dimension, timbers to rest on wall ledges and where entering walls to be self-releasing.

c. Where auxiliary beams are necessary, they should rest on top of main girders and not on strap iron stirrups.

Scuppered Floors.

It is recommended that where feasible floors be built with slight pitch (1in. to each 20ft.) and have proper scuppers with drain pipe.

Posts.

a. To be proportioned in size according to the weights to be carried. If of timber, smallest cross-sectional dimension to be not less than 8ins. and all corners to be rounded. To be superimposed throughout all storeys with ends connected by properly designed cast-iron caps (self-releasing as regards floor timbers) with cast-iron pintle and base plate. Neither timbers nor heavy machinery to be bolted to wall or posts.

b. Pillars, girders and beams, if of iron or steel, to be protected by not less than 2ins. of terra-cotta, concrete or its equivalent.

Finish.

No wood or other combustible finish to be used. A non-combustible finish without concealed space may be used.

Extra Hazardous Rooms.

To have special treatment.

Stairways and Elevators.

a. To be enclosed in brick shafts, with standard fire doors at all openings to building. Walls of shaft to pierce all floors and extend 3ft. above roof.

b. Shafts to be ventilated by ordinary thin glass windows opening outside (and not exposing windows in building itself), or by a thin glass skylight protected by standard wire netting (skylight can have a wired-glass top with thin glass sides).

c. There should be a 3-ft. drainage pit at the bottom of the stair tower or elevator shaft, connected with sewer to carry off water coming from upper floors.

d. Stairway extending through but one floor may be enclosed as follows: The entire stairway to be of incombustible material. Communication between floors to be entirely "cut-off" by a fireproof partition of terra-cotta, concrete or iron frame with metal lathing or expanded metal plastered on both sides. A standard fire door fitted with approved automatic device to be hung in this partition. A curbing at least 3ins. high to be placed around head of each stairway, floor to be inclined up to curbing.

Flues.

To be constructed in each case in accordance with the specifications of the National Board of Fire Underwriters.

Partitions.

To be constructed of incombustible material or of 2-in. matched plank, preferably coated with fire-retarding paint.

CLASS B.—ALTERATIONS TO BUILDINGS OF INFERIOR OR FAULTY CONSTRUCTION.

Sheathing or Plastering.

a. To be entirely removed if not fastened direct to studding or joists—*i.e.*, if there are spaces or openings from one stud or joist channel to another.

b. All openings in sheathing or plastering (from room to the concealed spaces) to be tightly "stopped" and sheathing to be kept in good repair.

c. Sheathing to be removed if of wood or other inflammable material

Concealed Spaces at Walls.

To be tightly shut off at each floor by heavy plank "stops" or two courses of brick (preferably the latter).

Concealed Spaces on Ceiling.

The joist spaces to have plank "stops" at intervals not exceeding 30ft.

Finish.

Oil, shellac, varnish or similar finish to be removed. A fire-retardant paint is advised.

Cornice *(alternatives a, b and c)*.

a. Boxed cornice to be removed unless it is outside of parapet and does not communicate with roof timbers.

b. Boxed cornices communicating with the roof timbers to have 2-in. plank "stops" placed at intervals not exceeding 30ft.

c. Where buildings adjoin and boxed cornices are continuous past division walls and communicate with roof timbers, the cornices to be provided with a masonry or acceptable metal cut-off at the division wall.

Skylights.

To be constructed in accordance with the specifications of the National Board.

Elevators.

If not in a brick shaft to have automatic traps at each floor-opening installed in accordance with specifications given in Class H

To be enclosed in a substantial non-combustible enclosure, such as terra-cotta, wire lath or expanded metal on iron frame with approved plaster or concrete on both sides, &c. Standard automatic fire doors to be placed at all openings.

Floor Openings.

To have trap door held open by fusible link in accordance with the specifications given in Class I.

Stairways.

To be enclosed in accordance with specifications given in Class J.

Belt Openings *(in floors)*.

To have curbing at least 3ins. high. Belt holes to be made as small as possible.

Belt Boxes.

To be removed and suitable incombustible guards or screening substituted.

Dumb Waiters and Chutes.

To be enclosed by sheet metal or by wire lath or expanded metal and plaster, with metal or tin-covered doors at all openings, preferably doors to be self-closing.

Fire Doors.

To be in accordance with the National Board Standard. To be placed at all door openings in fire walls or against exposures, as designated by the underwriters having jurisdiction. All fire doors to be kept closed when not in use, and to be provided with approved automatic self-closing devices. ……………………………………………………

……………………………………………………………

Shutters.

To be in accordance with the National Board Standard. To be placed on all windows in fire walls or against exposures, as designated by the underwriters having jurisdiction. Shutters to be closed and fastened whenever it is not necessary to keep them open ……………………………………

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Wired Glass Windows.

To be of approved wired glass in National Board Standard metal frames. To be placed at all window openings in fire walls or against exposures, as designated by the underwriters having jurisdiction. Window sashes to be provided with approved automatic self-closing devices.

CLASS C.—STANDARDS FOR HEAT, LIGHT AND POWER.

Steam Pipes.

To be properly bushed where passing through woodwork and to be properly supported and kept away from woodwork. No combustible material to be allowed to rest against steam pipes, and where necessary, pipes to be suitably protected The overhead method of steam piping is preferred.

Boilers.

a. To be in a building at least 30ft. detached or to be in a brick building either detached or with a standard cut-off from main building.

b. To be in a room of fireproof construction with standard cut-off.

Boiler Stack.

a. To be of brick (double with air-space if in main building), or if iron, to be outside or on a brick foundation extending through and 3ft. above the roof, such stack to be kept at least 12ins. away from any woodwork

b. An iron stack inside building is unapproved. Wherever such conditions exist, the following safeguards should be adhered to: Where passing through roof or floor, iron stack to have 12ins. clear space with a properly constructed metal collar extending 12ins. above and below all woodwork, and stack to be properly protected by metal guards or netting, so that combustible material cannot rest against the stack.

Uptakes from Boilers.

To be not less than 3ft. from all timbers, joists or other woodwork, unless uptake is completely covered with at least 4ins. of approved insulating material, in which case the distance may be reduced to 12ins.

Lighting

a. To be by approved electric or gas systems.

b. If electric, to be installed in accordance with the National Electrical Code.

c. If gas, jets to be made stationary where practicable, and when so located that they can come in contact with woodwork or other combustible material, jets to be protected by wire globes or guards, or to have proper ventilated shield.

d. Any form of lighting other than electricity or gas may increase the hazard, and in any event such lighting must be installed according to the rules and requirements of the National Board.

e. Kerosene oil lamps are not approved. If used, the following safeguards should be adhered to: Lamps to be supported by substantial metal hangers, there being a proper heat guard to protect the hanger and material overhead. Only approved material or metal-cased lamps to be used. Central-draught lamps are not allowed.

Power.

If electric or gas, to be installed according to the rules and requirements of the National Board.

CLASS H.—AUTOMATIC ELEVATOR TRAPS.

a. Open elevator shafts and hatchways shall be provided at each floor opening with a trap door which opens and closes as the elevator passes.

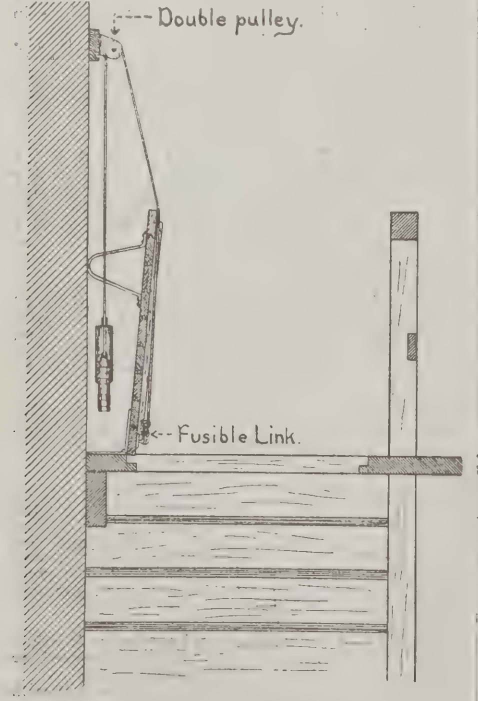
b. If the floor is of ordinary construction, or not more than 1¼ins. thick, the trap door shall be made of 1¼-in. sound, well-seasoned, narrow, matched boards, with battens screwed on.

c. If the floor is of mill construction or more than 1¼ins. thick the trap door shall be as just described and shall have standard lock-jointed tin covering, as required for fire doors, on the under side, the tin extended over all edges, including hole, if any, for cable, and nailed on the upper side of door. The hole for cable, if any, shall be as small as possible.

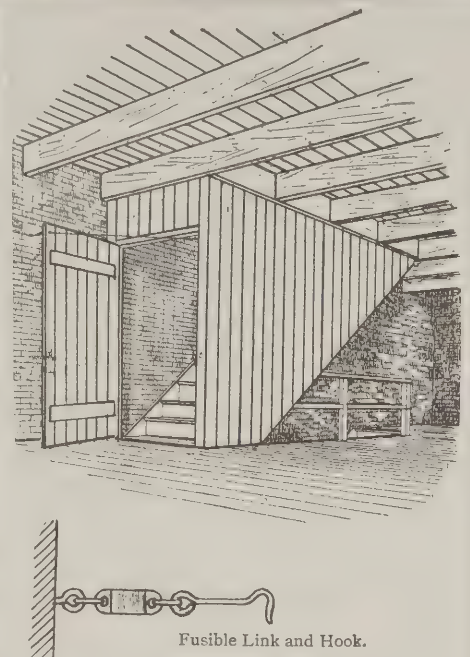
d. When the trap door is closed it shall extend beyond the opening on all sides.

e. Elevator left at a landing shall not be accepted in lieu of a trap door.

A trap opened and closed by the moving elevator is regarded as distinctly superior to other devices and should be generally used. However, if not employed, owing to high speed of elevator or other cause, automatic traps should be placed at each floor. They should be constructed as above, secured by stout wrought-iron hardware attached by bolts; be held open by a fusible link located on shaft side of door; be actuated from behind by heavy spring which, upon fusing of the link, will push trap beyond a vertical position so it will close by gravity; and be kept closed, except during working hours.



AUTOMATIC TRAP DOOR.


Fusible Link and Hook.

STAIRWAY ENCLOSURE.

CLASS I.—AUTOMATIC TRAP DOORS FOR STAIRWAYS.

a. If the floor is not more than 1¼ins. thick, the doors shall be made of 1¼-in. sound, well-seasoned, narrow, matched boards, with battens screwed on.

b. If the floor is more than 1¼ins. thick, the door shall be as just described, and shall have standard lock-jointed tin covering, as required for fire doors, on the under side, the tin extended over the edges and nailed on the upper side of the door.

c. Hinges to be of heavy wrought metal with straps extending well on to the door.

d. To be balanced with a weight on a cord running over double pulley on wall, a fusible link being inserted at point where cord is fastened to the door, so that door will close automatically in the event of fire.

If door is heavy it should have a balance-weight attached by wire cable to prevent accident, and a gravity-catch to hold the door when closed.

e. To be provided with a wrought-metal bow high enough to form a stop which will prevent the door being raised to a vertical line, thus keeping it in such position that it is sure to drop when link melts. Bow to be securely fastened to the upper side of the door, so that it will serve as a handle.

CLASS J.—STAIRWAY ENCLOSURES.

a. Stairways to have separate enclosure for each flight, not less than 1¼ins. thick, made tight and kept in repair. If approved fireproof material is not used, enclosure to be made of two thicknesses of matched boards, or of tongued and grooved or splined planks.

Double boarding is preferable to single planking, as it is not so liable to warp and open up at the seams.

b. To be provided with a door at each flight, preferably at bottom.

c. Doors to be not less than 1¼ins. thick, and unless standard iron- or tin-clad to be constructed of two thicknesses of matched boards or of tongued and grooved or splined planks. Heavy wrought-iron hinges, latches and catches to be attached by bolts.

d. Doors to be kept closed and latched when not in use. It is preferable to attach a stout spiral spring to all doors to keep same closed automatically, and doors which are kept open during working hours to be held so by a hook attached to a fusible link located as high on door as convenient.

e. Glass windows, if needed in stairway enclosure or door, to be fixed (not swinging) and of approved wired glass properly set.

(Buildings of Fire-proof or Mill Construction.)

Stair openings in buildings of such construction not "cut-off" in fireproof shafts are a violation of a most prominent principle of such construction.

When they exist, however, they should be enclosed by fireproof material under special specifications.

Recent Large Fires.—Among recent large fires are the following:—A fire which broke out on January 2nd at the Gun Wharf, Portsmouth, in the Camp Equipment Stores block, when damage to the extent of a quarter or a million sterling was done; the fire at New Barnet on Thursday, January 10th, when the saw mills and timber yard of Messrs. Alfred Lockhart, Ltd., were destroyed; and the big fire last Saturday in Glasgow at Messrs. Cumming and Smith's warehouse.

THE MONEY VALUE OF FIRE PROTECTION.

Some Interesting Figures.

In thinking of fires one's mind naturally reverts to water, beautiful fire apparatus, and wonderfully acrobatic men, rather than to the elimination of fuel for the fire. Cities vie with one another, not in how few fires they have, but in how quickly and excellently they can extinguish them. Now and again comes a holocaust, and then we buy a few more steam-engines, write pathetic obituaries, and go on the even tenor of our ways.

As a fact, however, the richer a city becomes, the more buildings it has, the saner it ought to be and the more it ought to reduce its fire risks by strict building regulations and better construction.

No country builds as rapidly and as expensively as the United States, and no country needs to build so rapidly, for none destroys its buildings so rapidly. Not even in Japan and China, the lands of bamboo and paper, are the fire losses as great, in sum, *pro rata* of population, or as numerous or in any way equal to the losses in the States. The past year has been a phenomenal one as regards building—indeed it has never been equalled. The total has probably reached £125,000,000, but of that vast sum not more than £15,000,000 will have been spent in reasonably safe construction, and certainly not £2,000,000 in absolutely fireproof construction.

Writing from the States, Mr. F. W. Fitzpatrick says:—"We know what is good construction—no one knows better than we—but we do not apply the knowledge, and our people prefer to pay for frills and furbelows. We have evolved the skyscraper; our buildings are richly ornamented, and we use most costly materials; our systems of heating, of ventilating, of lighting, of refrigerating, are unequalled; our plan arrangement is unexcelled; no one knows better than an American how to utilise every bit of ground, and how to get the most out of it; but, withal, we build too hastily and flimsily. And our fire losses have by rapid jumps reached the £40,000,000 mark per annum. The cost of our fires constitutes a tax eight times greater than the similar *per capita* tax of all Europe. New York averages 'invariably' 7,800 fires a year, and Chicago 4,100.

"By spurts we occasionally attempt to secure better conditions—after some great calamity there is much revision of building laws, but we are still deplorably far from possessing reasonably sane laws.

"With regard to San Francisco, it is well to note that had £2,000,000 more been spent originally in sane provisions against fire it would have reduced this loss at least £32,000,000. Or if the architects had spent even £120,000 more on the thirty-five so-called 'fireproof' buildings, or, rather, shifted that sum from frivolous ornaments to necessary precautions—covering every particle of steel framing, for instance, with hollow fireproofing tile—they would have saved those buildings intact, buildings in which £1,800,000 or more destruction was wrought. Simpler still, had the precaution been taking of protecting the windows of those buildings with wired glass, at an additional expenditure of possibly £12,000, their interiors and contents would certainly have been saved."

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
February 13, 1907.
FIRE SUPPLEMENT (MONTHLY).
Vol. XXV, No. 627. **6, Great New Street, Fetter Lane, London, E.C.**

THE KINGSTON DISASTER FROM THE FIRE POINT OF VIEW.

So much has been written about the calamity at Jamaica in the public press that we do not care to go into the matter in great detail. We desire, however, to present a few particulars of the situation from the fire point of view.

This is the third occasion within a year that the continent of America has been visited by a disastrous earthquake, followed by a serious conflagration.

The more intense shocks were scarcely over when fire broke out, as was only to be expected, among the ruins of the buildings, and also, as in the previous earthquakes, the water mains were broken, and the fire brigade paralysed by the excitement and confusion of the moment. By the time confidence was restored to a certain degree the fire had got a firm hold and was sweeping towards the sea front. Fortunately the wind was blowing from the north-east, and this fact helped to confine the fire to the more southern parts of the city.

About one-thirtieth of the town, comprising, roughly, the triangular part lying between Parade Gardens, Duke Street and Princes Street, taking the parish church for apex and the sea-front for base, was completely destroyed.

The greater part of this area consisted of wharves and warehouses, but it also included many of the chief buildings.

Numbers of buildings were either razed to the ground by the earthquake or totally destroyed by the succeeding fire. Among the most notable of these were the Supreme Court, the Military Hospital, the Myrtle Bank Hotel, the Savings Bank, the Colonial Bank, the Jamaica Club, the Customs Buildings, the Railway terminus, the Masonic Temple, the Training College and Hope College, the Roman Catholic church, the parish church and the church of St. George, while among the newspaper offices, that of the "Daily Telegraph" was the only one remaining. Over a thousand people lost their lives, and the damage, which, however, can only be approximately estimated, will probably reach £1,500,000.

For a time some excitement prevailed over the question of insurance liability, but it was soon understood that the companies were completely protected under the terms of the policy contracts. There were 21 insurance offices doing business in Jamaica, eighteen British, two German and one local, called the Jamaica Cooperative Society.

All the chief English offices repudiated liability, as most of the policies issued contained a clause of the Uniform Policy Conditions (No. 5) which runs:—"This insurance does not cover loss or damage by fire during (unless it be proved by the insured that the loss or damage was not occasioned thereby) or in consequence of subterranean fire, earthquake, hurricane, volcanic eruption or other convulsion of Nature." As nothing could be clearer than this, it must be admitted that the insurance companies have acted well within their rights.

FIRE TESTS WITH REINFORCED CONCRETE FLOORS.

The British Fire Prevention Committee's testing operations for the current year commenced last Wednesday, when tests on reinforced concrete floors were carried out.

There were present about sixty Government and municipal officials and officers of fire brigades and insurance companies, including Sir James Williamson, C.B., Col. Sir E. Raban, K.C.B. (Admiralty), Sir Henry Tanner, I.S.O. (H.M. Office of Works), Col. G. K. Scott-Moncrieff, C.I.E. (War Office), Mr. W. T. Hatch, M.I.C.E. (Metropolitan Asylums Board), Mr. Johnson (General Post Office), and also the chairman and general hon. secretary and nearly the whole of the executive officers of the Committee.

The first test with a reinforced concrete and brick-lined floor under a four hours' fire-test, for classification as "Fully Protective," attained classification with a deflection of about 3ins.

A hollow reinforced concrete floor which was also put forward for test for a similar classification obtained classification with a deflection of about ⅓in.

The load in both cases was 2½cwts. per ft. super. and the fire temperature ranged between 1,800 and 2,000 degs. Fahr. At the conclusion of each test water was applied from a steam fire-engine for a period of five minutes.

These floor tests form part of an important series of tests with reinforced concrete structures which are being conducted by the Committee on very elaborate lines.

Some preliminary load tests with sections of the hollow reinforced concrete floor were also undertaken, and these will probably serve as a basis for a systematic series of tests in this direction, the floor sections under investigation having 14ft. and 28ft. spans respectively to a width of about 2ft. 6ins.

The official reports of the Committee on the tests will be published in due course.

The Load Tests.

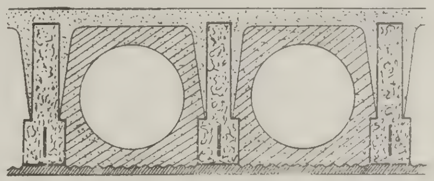
These are a new departure in the Committee's work, and have arisen owing to the fact that many floors of high fire-resistance are not necessarily the best load-carriers, while *vice versa* good load-carriers often make extremely bad showing in fire-resistance.

A special sub-committee has been formed to look into the general arrangements of such load tests, of which Sir James Williamson, C.B., late Director of Dockyards, occupies the chair.

The Testing Sub-Committee on duty for the load tests had Mr. Max Clarke, F.R.I.B.A., as directing member, and further comprised Mr. Matt. Garbutt, F.R.I.B.A., Lieut.-Col. J. Winn, R.E., Mr. Frederic Farrow, F.R.I.B.A., Mr. Percy Collins, F.S.S., and Chief Officer Dyer (vice-president of the National Fire Brigades' Union).

It is certainly a great advantage that such independent sub-committees can be formed to take charge of such investigations, and the results of these load tests combined with those of fire tests should prove very useful reading.

Regarding the hollow reinforced concrete floor tested last Wednesday, it is of Continental origin and is known as the Herbst floor. We reproduce below a section. It comprises a number of light reinforced concrete beams in which a bar takes the place of the usual rods, with hollow concrete tubes slipped in between the beams; the whole grouted in with concrete and the soffit plastered.

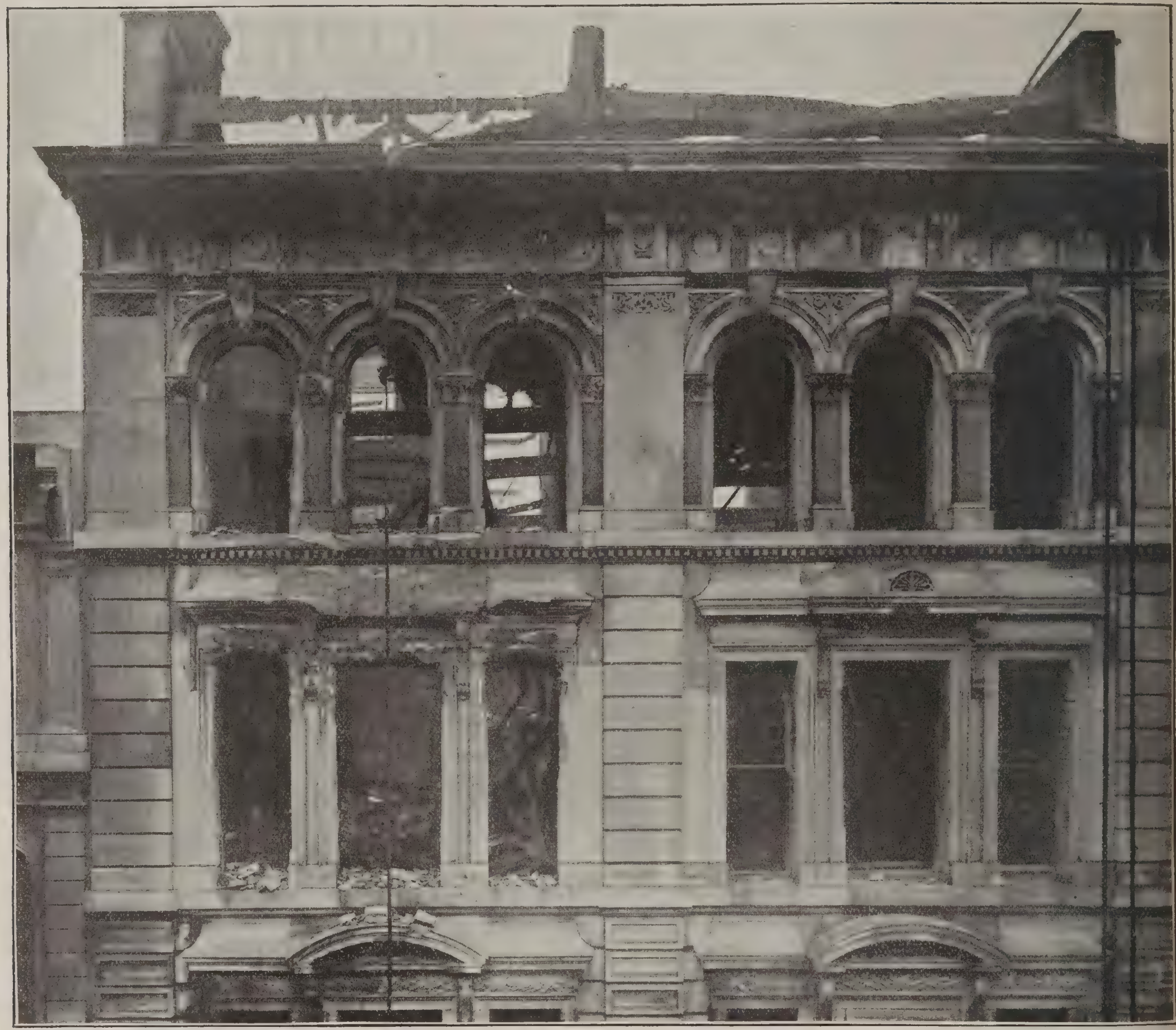

THE HERBST FLOOR.

The impending tests on reinforced concrete floors are, we understand, to be of a very comprehensive order, so that with one or two notable exceptions the whole of the reinforced concrete floors available for use in the metropolis will have been under test before the end of the summer.

We also understand that some important tests with fire-extinguishers of the household type are pending, amongst these being probably a series of tests with the Minimax Extinguisher; and the Committee also announce that an investigation into concrete aggregates is to be undertaken.

Tests with Fire Extinguishers.

The Committee's Red Book No. 115 gives particulars of the tests made in July and October last with the dry-powder extinguishers manufactured by the Kylfire Co., of Eastbourne. This was the first test of a portable hand extinguisher undertaken by the Committee, and it shows the efficacy of this particular one in smothering fires having little body and depth in their incipient stage. The different tests demonstrated that the powder (the composition of which is a secret) when thrown with force against the flame subdued it and quenched it, although with softer loose material it did not stop the smouldering, which in some cases burst out again into flames.



UPPER STOREYS OF WAREHOUSE IN WOOD STREET, CHEAPSIDE, GUTTED BY FIRE LAST WEEK. [*Photo.: Bolak.*

THE WOOD STREET FIRE.

This notable fire of last week had the making in it of a Cripplegate conflagration, the building first attacked having all that could be defective in building construction—namely, bad primary construction, small areas, and usless matchboarding. It redounds, therefore, to the credit of the London Fire Brigade, and to its excellent methods of mobilisation and determined attack on this fire, that it should have prevented a far-reaching disaster in one of our worst-built yet most valuable centres of city life. It is really extraordinary, on the one hand, that buildings of such construction should be allowed to exist in the very heart of the metropolis, for, no matter what the Building Act may be, one would have thought that the insurance companies would, in the interests of their own pockets, have practically made it prohibitive for people to insure structures of this description, and would thus have compelled reconstruction.

It is when fires like this occur that one sees how necessary are those provisions of the London Building Act which were unfortunately deferred in the session of 1905, and how essential it also is that certain provisions in the Act should be of a retrospective character, as in the case of the present fire-escape at built-out shop requirements.

We trust that the Wood Street fire will serve as a lesson to building owners, of how much wiser it would be to rebuild at their own convenience, possibly by sections, instead of first awaiting the destruction of their premises by fire, or, failing the possibility of rebuilding, how much wiser it would be to safeguard their premises with all those appliances and improvements in construction that can be so feasibly applied in old buildings.

To put it quite plainly, in nine cases out of ten it is quite unnecessary to matchboard walls in business premises. Such installation is merely due to false economy, for plastering or lining with a fire-resisting material would do what is wanted in a far better manner, would probably save insurance, and would certainly be more sanitary.

Similarly, the protection of area windows by suitable fire-resisting glazing and proper frames, supplemented where practicable by automatically closing shutters, would be a safeguard of value that cannot be over-rated.

It will probably be too far to go over the whole points of what the building owners should do in their own interests, for apart from the fact of the heavy insurance rate on such property, and in spite of the fact that insurance money is likely to be paid with considerable promptitude, the loss of business to any building owner caused by a fire is, in most cases, absolutely a dead loss of considerable magnitude, from which, as a matter of fact, some firms never recover.

In connection with the accompanying photograph of the warehouse in Wood Street, Cheapside, it is interesting to point out how the stonework has been spalled by the flame, and the cornice cut and broken by the telegraph wires, while, within, the burn-out has been complete. Although the damaged premises cover a wide area, going back a considerable depth, and the property adjoining has suffered severely from the intense heat, practically the whole of the serious damage was confined to the offices comprising Nos. 9, 10, 11 and 12. The building was not of recent construction, but a good deal of ironwork had been introduced into it, and the intensity of the fire is indicated in the manner in which the girders have been warped. The damage done by the fire is estimated at about £70,000.

Memoranda

In an era when steel frame and concrete and reinforced concrete are so much to the fore, it is well to lay emphasis on the necessity for thorough protection of the steel—more particularly as concerns reinforced concrete, in which there has been an unfortunate tendency not to protect the steel rods sufficiently, and even where protection is provided it is frequently reduced considerably by difficulties of workmanship. It would be interesting to see, for instance, how much concrete protects the metal rods on the soffit of the floor panels in, say, the new Manchester warehouses. At the new Brussels warehouses we know of instances where the protective layer of concrete on the soffit is less than ½in.

* * *

It is unfortunately all too common a fault, even in well-managed warehouses, to leave fire-resisting doors open day and night. We have in mind a case where a certain important door between two highly inflammable blocks of buildings has been kept open day and night for at least three years, the same wedge which was apparently used in the first instance to hold this door open being still in position.

* * *

Some remarks made recently at the Battersea Coroner's Court at an inquest on the body of a child who lost her life at a fire at Battersea are worthy of notice. Mr. Gamble, second officer of the Fire Brigade, said that the house where the fire occurred was of the kind built 40 years ago—jerry built. Under the present regulations houses of more substantial type were required. There was no power to condemn houses unless it could be shown that they were dangerous, and he should not say that the house in question was a dangerous one. Under the new Building Act the authorities had an enormous amount of work to see to, and it would be a long time before they could deal with private houses. The fire at this particular house at Battersea seems to have been caused by a spark falling out of the kitchen grate. It was stated in evidence that the jamb by the fireplace sometimes got very hot, and the floor near the fireplace was defective. The coroner pointed out how important it was that due regard should be paid to safeguarding houses from fire as well as making them sanitary and comfortable. The jury returned a verdict of accidental death.

* * *

Of new catalogues arriving from the United States in respect of fire-resisting construction and fire-protective equipment, we observe with considerable interest a catalogue of the Mullins sheet-metal window casements and sashes. The importance of fire-resisting glazing has been emphasised in these columns from time to time, and we have pointed out the necessity of improving the casements or skylights in which the glazing is placed. The Mullins casements and sashes are certainly a step in the right direction, and it only remains for them to be tested under British conditions to see if they will not materially affect the duration of time during which fire-resisting glazing may be safely reckoned upon to prevent flame spreading from risk to risk. The principle of design adopted by our American friends is that of hollow sheet-metal framing, the frame being riveted, locked, and seamed in such a manner that solder is not used anywhere for holding parts together, but only as a finish to mitres, &c. The gauge of steel applied is of No. 22 gauge galvanized steel. The agency for these casements in Great Britain is held, we understand, by Messrs. Arthur L. Gibson & Co.

RECENT FIRES.

On January 27th an outbreak of fire occurred in the children's convalescent block of the Enfield and Edmonton Joint Isolation Hospital. The flames broke out in a corrugated iron and matchboard building, about 100ft. in length, and are supposed to have arisen through the overheating of a stove. The hospital is planned on the block system, and the fire occurred in one of the wood-lined pavilions which have been erected since the permanent blocks were built. The pavilion was practically destroyed, but, thanks to the prompt action of the nurses and matron (who fixed the hose on the hydrant and played on the flames) none of the inmates suffered injury.

On January 27th also a fire broke out at the Cancer Hospital, Fulham, through some coke in the stokery catching fire on account of overheating.

The parish church of Fulwood, near Sheffield, was discovered to be on fire on January 23rd. At the time workmen were in possession of the building putting in a new concrete foundation for a wood-block floor, and they, noticing the roof was on fire, gave the alarm and commenced operations to subdue the flames, which were subsequently extinguished by the Sheffield Fire Brigade.

Damage estimated at many thousand pounds was done by fire on January 23rd at the spinning and carpet works of Messrs. Brinstons, Ltd., at Kidderminster.

Some excitement was caused in the City on Wednesday last by the report that a fire had broken out at the Bank of England. At about one o'clock people in the vicinity saw volumes of smoke issuing apparently from one or other of the chimneys above the Lothbury entrance to the Bank. The Bank's private brigade investigated the matter, and discovered that it was merely the case of a chimney that wanted sweeping!

On the same day rather an alarming incident happened at a fire which broke out on the premises of a gunmaker in the Waterloo Road. A number of cartridges exploded while the fire was in progress, causing a regular fusillade. There were, however, no personal injuries.

Since the destruction by fire of two Nottinghamshire churches special precautions have been taken to guard neighbouring edifices. At Hucknall Torkard Church, where Byron is buried, fire extinguishers are to be provided, and the amount of insurance is to be raised to £20,000.

A SUGGESTION AS TO FIRE-RESISTING CONSTRUCTION.

All history seems to bear testimony to the fact that it was a very poor country and epoch that could not produce at least one prophet: in other words, prophets are ordinarily cheap: so the present writer may be pardoned and tolerated.

That fire-resisting construction is in its final development, few, if any, will admit, but as to just what development will come from the present systems none of us feel assured, so there remains considerable room for speculation.

The tendency seems to be more and more toward the increased use of concrete. New methods of employing this material are being evolved almost daily, many of them bad, some better, and a very few good, but all working more or less in the dark and seeking results through experiment and experience.

In the writer's judgment, probably one of the best developments of fire-resisting construction is that combining concrete and steel and covering the surfaces with porous terra-cotta. In its present form the expense of this type militates against its more general adoption.

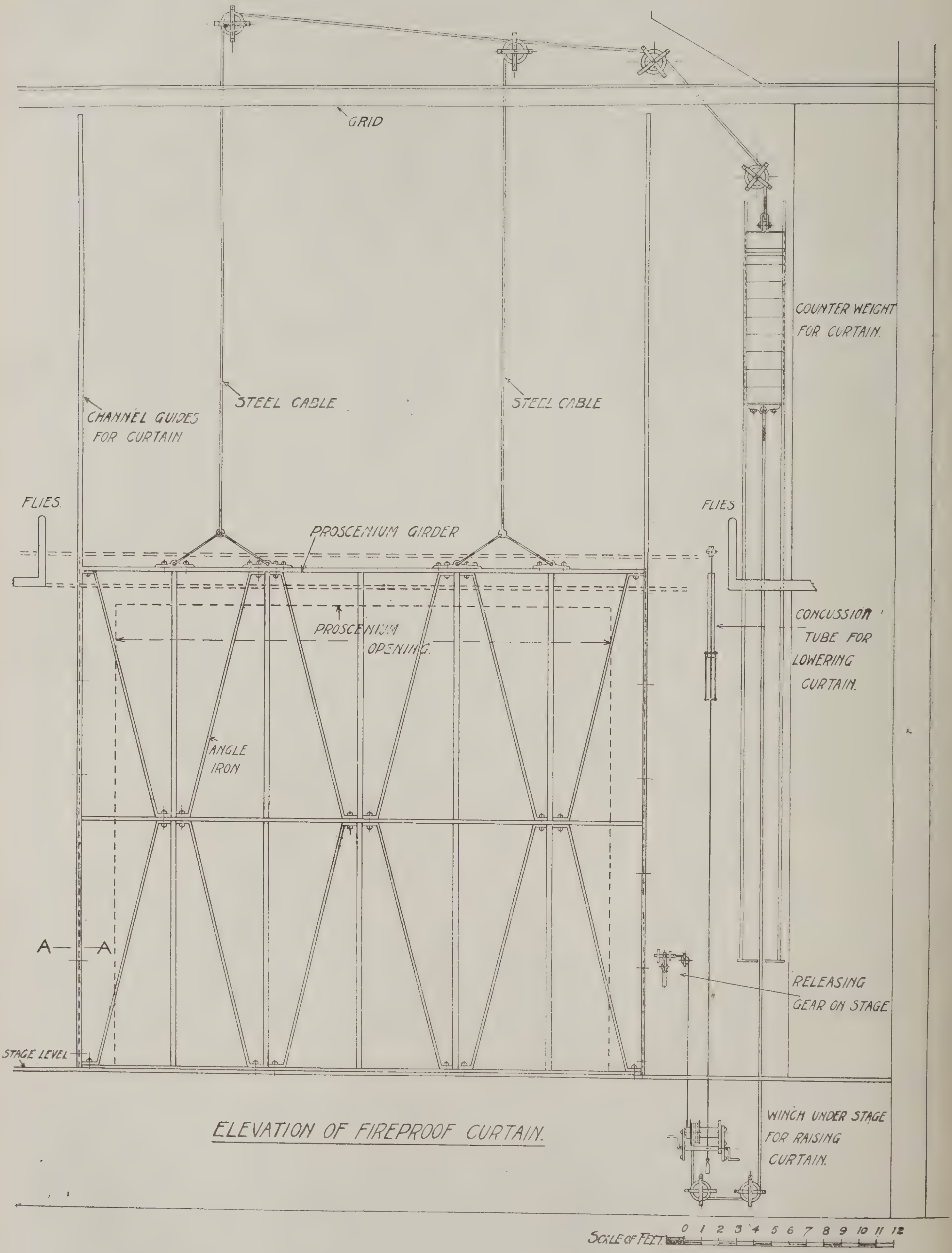
One thing which has a tendency to vanquish the horror of expense that operates so strongly against better fire protection is the fast increasing cost of timber. This will greatly lessen the difference in cost between ordinary wood joist construction and the fire-protective type, so that the contrast will not influence the prospective builder to adopt the cheapest possible method of construction. He will gradually become reconciled to the fact that the best is always the cheapest when real quality and utility are desired.

The future may bring a construction with the exposed surface composed of porous burnt clay and an interior of concrete surrounding a nucleus of steel, these three elements combining to make a unit, whether in the form of a column or girder. This principle, after all, would be nothing new, but rather a harking back to the old Roman construction, with the exception, perhaps, of the metal basis designed to carry the load.

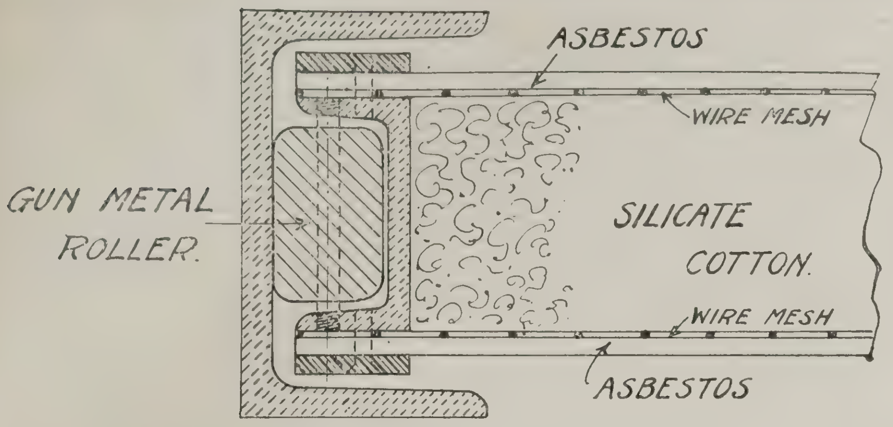
Another development of fire-resisting construction will probably be in the direction of cheap small dwellings, this development tending toward the substituting of light steel framework for wood. This may perhaps be accomplished by extra light sections of beams, channels, &c., rolled so thin that they can be fitted and drilled in the field with the ordinary hack-saw and breast drill, using the steel frame just as the wood frame is used to-day, the covering or filling to be composed of a veneer of brick or concrete, as best adapted to the conditions and desired purpose.

Hand in hand with this development will come the gradual elimination of wood as a necessary element of construction, until it is not unlikely its use as a fundamental basis will be a thing of the past. With the arrival of this Utopia insurance rates should go down to levels unknown or undreamt of to-day.

That the tendency is toward such results seems fair to say, although the advance thus far made often seems almost pitiable and somewhat discouraging. But the signs are in the sky. W. I. P.


GRID
COUNTER WEIGHT FOR CURTAIN.
STEEL CABLE
STEEL CABLE
CHANNEL GUIDES FOR CURTAIN
FLIES.
FLIES
PROSCENIUM GIRDER
PROSCENIUM OPENING.
CONCUSSION TUBE FOR LOWERING CURTAIN.
ANGLE IRON
A— —A
RELEASING GEAR ON STAGE
STAGE LEVEL
ELEVATION OF FIREPROOF CURTAIN.
WINCH UNDER STAGE FOR RAISING CURTAIN.
SCALE OF FEET 0 1 2 3 4 5 6 7 8 9 10 11 12

THE FIRE CURTAIN AT THE WALDORF THEATRE, LONDON.



WALDORF THEATRE CURTAIN: SECTION ON LINE A—A.

FIREPROOF THEATRE CURTAINS.

On the opposite page we are able to give a specially-drawn diagram elevation of a modern fireproof theatre curtain, while above is a section showing the filling. The curtain in question is the one which Messrs. Strode & Co. have fitted at the Waldorf Theatre to meet the latest requirements of the London County Council. It has double wire-woven asbestos cloth on each side, and is packed between with silicate cotton. Control is affected by means of a lever on the stage, with a duplicate releasing gear by the stage door. On the clutch being released, the curtain descends to the stage floor in 18 seconds, a special concussion tube being provided to prevent shock, so that the curtain reaches the floor without any jar; while at the same time that the curtain is released the water sprinkler is also opened—a most effective device. The curtain can be raised in 35 seconds by means of the double-action winch provided below the stage, as shown on the drawing.

To readers who are familiar with the theatre curtain as viewed from the auditorium the accompanying illustrations will, we think, be particularly interesting.

THE FIRE IN HARRISBURG.

Owing to the Jamaica disaster the big fire which occurred recently in the city of Harrisburg, in the United States, has not attracted the attention it would have commanded at another time. This conflagration was one of those typical ones in which American cities seem to delight. It is difficult for the average English reader to quite understand the conditions of a city of average size in the United States. To give an idea of the conditions, therefore, we publish a summary of the building by-laws and regulations of the city of Harrisburg.

The fire in question, which practically threatened the whole of the city, involved the destruction of the opera-house, the theatre and many other important buildings, with a loss of more than £250,000.

By-Laws and Regulations.

A city ordinance requires the appointment of a building inspector, who is to be a competent architect or builder of at least seven years' experience, to see that the buildings are erected in accordance with the requirements. The frequency of inspection depends upon the character of the building under construction and the amount of work in hand, but the inspector estimates that the average is about eight inspections per day.

The following is a summary of the principal provisions in the by-laws relating to fire-protection :—

Fire-resisting Construction.—All buildings more than 75ft. high, except grain elevators and buildings of lesser height if of certain specified occupancies, to be fire-resisting. Some buildings also required to be fire-resisting in the first storey. Heights and areas unlimited. No provision as to thickness of fireproofing or of any other important points.

Joisted Construction.—Heights limited to 75ft. and undivided areas to 10,000 sq. ft.

Frame Construction.--None, except small sheds or temporary structures, permitted within the fire limits.

Roofs and Roof Openings.—All new roofs to be covered with incombustible materials; old shingle roofs may be repaired. Roof houses to be at least metal-clad, with the space between studding filled with incombustible material. All roofs to have scuttles or bulkheads with permanent ladders or stairs leading thereto. Skylights over 12 sq. ft. in area to have metal frames.

Thickness of Walls.—Satisfactory except for 8-in. walls permitted in the dwelling-house class. Only 4ins. of masonry required between ends of beams entering opposite sides of walls. No chase or other vertical recess to be made in any wall to a depth greater than one-third the wall's thickness.

Parapets.—All walls over 15ft. high, except where finished with cornices, gutters, or crown mouldings, to be parapeted 2ft. and properly coped.

Window Openings.—Every building more than two storeys high (except dwellings, hotels, office buildings, school houses and churches) to have all openings above the first storey which are exposed within 30ft. protected with iron- or tin-clad fire shutters; to be closed after business hours each day. All shutters opening on fire escapes, and at least one row vertically in every three rows on the front window openings above the first storey to be so arranged that they can be readily opened from the outside by firemen.

Openings in Division and Party Walls.—Practically no provisions.

Floor Openings.—Hoistways or freight elevators not enclosed in fireproof shafts, with fireproof doors or openings, to be trapped. Stairs to be in fireproof enclosures in a few specified cases. All walls and partitions forming light and vent shafts to be of brick or such other fireproof material as may be approved by the inspector, and carried up not less than 3ft. above the level of the roof.

Standpipes and Sprinkler Systems.—Standpipes of 2½ins. diameter, fitted up with regular fire department couplings and at least 50ft. of 2½in. hose, required in all parts of theatres; to be supplied by automatic steam pump. Automatic sprinklers required over the stage and other hazardous parts of theatres.

Quality and Strength of Materials.—Left largely to the discretion of the inspector.

Fire Escapes.—Requirements satisfactory.

Fire Limits.—No frame or wooden building permitted to be erected within the fire limits, which are sufficiently inclusive. The general tendency throughout the city is toward brick construction.

Conclusions.

The building laws contain a number of good provisions, but are inadequate from a fire-protection standpoint. They do not provide for modern types of construction or for proper protection for floor and roof openings, they do not properly limit floor areas, and are inadequate in many other salient points.

The building department as now constituted is entirely inadequate to supervise and control building operations, owing to the present boom in building construction.

FIRE-RESISTING CONSTRUCTION.

A Comparison of Proportionate Costs.

The table on the next page, showing how the cost of fire-resisting buildings is divided among the various items of construction, has been prepared from data furnished by architects and builders in the principal cities of the United States. As the analysis of the cost of construction was not uniform for all data received, some difficulty was experienced in an attempt to show a complete comparison. Thus, in some cases, the cost of foundations has not been given, and is probably included largely under mason work. The comparison is, however, practically complete in most cases, as far as the five general subdivisions are concerned, and should be of value as indicating the amount of readily damageable material of a building in proportion to its total value.

Each column of figures in the table represents the data for an individual building, except some of the figures for New York, which show the average for a large number of buildings.

It has been demonstrated, at Baltimore and San Francisco, that a first-class fire-resisting building, exposed to a conflagration, may be expected to sustain very heavy damage on all items of construction except foundations and steel frame. These two items represent, approximately, 20 per cent. of the value; and to this may be added about 10 per cent. for other salvage, chiefly on mason work, thus giving 70 per cent. damage. This figure is close to the average loss, and less than the damage to a number of individual fire-resisting buildings in these conflagrations.

Although it sounds paradoxical and discouraging to say that a first-class fire-resisting building may be damaged 70 per cent., these buildings are to be encouraged, as they will retard and possibly limit a conflagration, if properly grouped. This is especially true if all window openings are protected—side and rear window protection only is better than none. While an excellent fire department and numerous buildings equipped with automatic sprinklers are very essential, nothing is, perhaps, a more effectual barrier to conflagrations than the grouping of fire-resisting buildings. They have demonstrated their ability to stop conflagrations when the fire can not pass at the side of them. The Horne Building, in Pittsburg, and the Granite Building, in Rochester, probably saved these cities from conflagrations similar to those at Chicago, Baltimore and San Francisco.

Only such fire-resisting buildings as those described in the standard specifications of the National Board of Fire Underwriters are contemplated in the above statement. So-called fire-resisting buildings where the steelwork is but partially protected, or that are deficient in other essential features, will be likely to show a total loss, as did the wholesale building of Sibley, Lindsay & Curr Co., in Rochester during the conflagration of 1904. This building was of first-class fire-resisting construction, except that no protection was provided for the steelwork. The additional cost of this protection would have been comparatively trifling.

F. J. T. STEWART

Table showing proportion of value in the various items of construction of fire-resisting buildings.

The figures opposite each item represent percentage of total cost of building.

—	New York				Chicago						Boston																	Baltimore								St. Louis	
	Offices		Hotel	Ware-house	Offices				Merc'tile Premises		Offices								Mercantile Premises							School	Storage	Offices								Offices	
Height in storeys	10	12									9	11	10	10	11	11	11	11	7	4	6	3	5	5	6	3	7	11	12	7	14	9	8	10	7	12	12
Cost in cents per cubic foot		40			30.3	34.8	32.3		14.	23.6	34.		35.	49.	67.	41.8	45.	34.			21.5	22.	29.			29.6											
FOUNDATIONS					**4.4**	**2.34**	**5.67**		**6.00**	**10.74**	**10.6**	**5.13**	**4.32**	**7.5**	**4.42**	**5.8**			**14.2**	**14.**		**11.5**	**13.5**	**24.5**		**7.4**		**5.62**	**4.37**	**7.25**					**4.3**	**5.**	**7.**
Excavations and Back Filling																												1.22	1.25	2.07					4.3		
Shoring Banks, &c.																													1.00								
Foundation Footing and Concrete																												4.4	.74	5.							
Rubble Stone and Granite Pier Caps																													.65								
Sidewalks and Curbs																													.13	.11							
STEEL FRAME	**24.0**	**22.50**	**16.0**	**36.5**	**19.70**	**14.0**	**11.86**	**10.6**	**27.6**	**38.66**	**14.4**	**27.4**	**22.5**	**15.**	**25.7**	**21.8**	**21.4**	**24.6**	**8.25**	**2.2**	**22.1**	**19.32**	**14.65**	**14.3**	**7.95**	**21.2**	**21.6**	**13.6**	**14.54**	**19.52**	**9.9**	**9.**	**10.1**	**11.4**	**17.5**	**15.0**	**15.0**
Material																													11.79								
Erection																													1.7								
Shop Drawings																													.49								
Painting																													.24								
Teaming																													.32								
MASON WORK	**26.56**	**20.10**	**31.5**	**32.5**	**26.31**	**27.96**	**22.3**	**38.5**	**27.6**	**44.79**	**40.4**	**15.0**	**32.23**	**41.6**	**33.60**	**27.57**	**34.85**	**26.**	**33.65**	**31.45**	**22.88**	**30.6**	**17.42**	**26.**	**38.6**	**30.46**	**68.62**	**23.76**	**28.5**	**34.15**	**30.15**	**31.31**	**37.2**	**29.9**	**35.5**	**20.0**	**25.0**
Brick—Common											27.5	8.3	18.9	15.	19.7	17.75	17.7	16.9	29.2	30.	16.8	24.	9.75	23.8		20.1	64.	10.1	6.59	11.21				8.98	13.5		
Brick—Face or Pressed																													1.82	1.26							
Brick—Enamelled																													.86								
Brick—Cleaning and Pointing																													.21								
Terra Cotta	1.41	2.06			10.04		5.76																					4.34	7.61	5.07	3.9	2.5		3.5			
Stone	2.75	1.50				10.30					7.1	1.75	8.17	16.6	5.25	3.55	10.4	4.54	4.45	1.45	3.3	6.6	6.95	2.14		6.6	4.62	2.55	4.22	9.34	4.05	7.4	27.3	8.7	9.4		
Marble		10.90									5.8	4.95	5.16	10.	8.65	6.27	6.75	4.56			2.78		.72	.08		3.76						.83					
Wall Lining or Furring																												.77				1.8					
Floor Arches, Roof, &c.					11.06	9.16	5.8			22.08																		3.87	4.73	3.68	6.8	6.6	3.4	3.6	6.6		
Cinder Concrete Filling over Arches					1.06	1.30	1.24			.47																		.57	.58	.49					6.		
Partitions																												1.56	1.88	3.1							
Partitions—Cleaning and Wrecking																																					
Safety Deposit Vaults																															7.6			5.16			
Miscl. Scaffolding and Wrecking																																.48					
Miscl. Masonry	22.40				4.15	7.2	9.5			22.24																					7.8	11.70	6.5				
EQUIPMENT	**20.65**	**20.89**	**12.0**	**11.25**	**24.96**	**24.54**	**25.04**	**23.2**	**20.8**	**2.26**	**9.48**	**30.3**	**18.05**	**15.99**	**24.45**	**20.12**	**23.02**	**23.53**	**8.98**	**23.9**	**18.71**	**12.3**	**11.84**	**10.65**	**19.09**	**16.25**	**2.46**	**19.18**	**24.54**	**15.96**	**18.69**	**26.71**	**15.23**	**21.23**	**12.69**	**17.0**	**16.0**
Elevator Plant	5.70	5.28			4.65	7.81	5.48				3.29	12.4	3.5	4.66	3.92	5.56	4.3	7.1	7.65	1.54		5.07	2.44	4.25	6.45	2.39		7.6	7.68	8.15	5.	5.68	3.8	7.7	4.02		
Plumbing	3.49	4.16			6.58	5.90	6.19			.85	1.74	4.75	3.4	4.	4.8	5.45	2.92	5.47	.51	1.85	3.68	2.9	5.07	1.25	1.5	4.32		3.26	3.55	2.61	4.13	3.5	3.7	3.4	3.76		
Heating System	5.85	5.85				.67	5.88				2.71	8.4	4.83	5.33	2.88	2.48	8.46	7.8		9.85	5.5	3.34	2.34	1.36	2.52	7.64	1.54	4.6	7.06	3.54	4.2	3.6	2.2	6.7	5.15		
Boiler Plant						1.92	1.86			.85			1.4		5.68	2.37				10.4	7.15			1.07								1.9					
Lighting System, Wiring and Fixtures	5.37	5.6			3.82	2.76					1.74	4.75	3.79	2.00	1.62	4.26	7.34	3.16		.26	2.38	1.03	1.99	1.5	7.2	1.9	.92	2.54	5.05	1.38	2.03	1.9	1.6	3.	1.16		
Dynamos, Switchboards, &c.							3.34																									2.18					
Fixtures						.32	1.24						1.13		5.55				.825					1.22	1.42			.7	.49		1.05	.65					
Mail Chute	0.24				.24	.06	.13																					.48	.27	.28	.18		.33	.43			
Filter Plant																													.44								
Refrigerating Plant																															.93						
Safes																																1.9					
Vault and Safe Doors					.24	.29	.32			.56																					.63		3.6				
Flash Signals and Indicators																															.54						
Furniture																																5.4					
Ventilating					9.43	4.80	.60																														
TRIM AND FINISH	**28.40**	**22.26**	**33.25**	**14.75**	**24.44**	**29.45**	**35.28**	**27.7**	**18.3**	**4.39**	**24.87**	**22.11**	**22.4**	**19.34**	**12.16**	**24.73**	**21.30**	**26.11**	**34.18**	**28.27**	**36.32**	**23.36**	**41.35**	**24.70**	**34.57**	**24.92**	**7.24**	**36.06**	**27.56**	**22.83**	**36.20**	**28.78**	**36.63**	**26.89**	**25.04**	**33.0**	**27.0**
Carpentry—Rough					8.90	6.53	8.54			2.86																		2.03	2.59	.22	10.9	9.8	5.4	7.9	1.6		
Carpentry—Finish	20.50	10.				1.88					16.6	14.3	13.4	13.2	6.54	15.75	13.6	18.9	31.2	24.4	16.8	17.5	29.	19.9	30.8	15.1		5.27	4.31	.51					5.7		
Hardware—Rough					.96	1.70	1.5																					.32	.29	1.7		.64	.9	1.16	4.95		
Hardware—Finish																												.74	.88	5.1	.83						
Marble	2.83	9.85			5.02	4.17	7.61			.25																		6.74	7.11	1.42	10.5	5.4	10.1	6.2	2.8		
Mosaic	1.25																											.14		1.99			1.2				
Glass					1.02	1.32	3.37																					1.44	9.	1.13	1.4	7.5	1.4		.89		
Slate																																					
Plastering	3.82	2.41			2.97	3.68	2.35				3.32	5.5	3.3	2.66	1.93	5.2	2.74	3.55	.572		12.6	2.0	6.7	.51		4.3	1.54	2.94	3.05	2.96	2.9	4.21	3.7	2.7	1.4		
Fresco					1.84	3.49	1.78																					.88									
Paint and Varnish					1.64	2.05	1.39			.30	2.9	1.65	4.	2.33	2.63	2.6	3.74	2.68	1.14	1.58	5.4	3.26	3.6	2.86	2.34	2.8	.30	2.00	1.34	1.45	2.9	1.6	1.4	2.9	1.5		
Office Partitions (wood and glass)																												2.65									
Ornamental Iron					1.09	2.58	6.19																					9.70	5.87	4.62	6.4	5.	10.5	5.5	6.8		
Skylights and Sheet Metal					1.00	2.05	2.55			.98	2.05	.66	1.7	1.15	1.06	1.18	1.22	.986	1.27	2.29	1.52	3.6	2.05	1.43	1.43	2.72	5.4	.71	1.22	1.54	.37	.63	.83	.53	2.4		
Office Grill																												.5		.19			1.2				
GENERAL EXPENSES			**7.70**	**5.00**																								**1.83**	**1.92**		**5.17**	**4.31**	**.36**	**11.2**	**6.94**	**10.0**	**10.0**

THE PROTECTION OF WINDOW OPENINGS.

A fire-resisting building has been defined as one which will confine fire of interior origin to the unit of area within which it starts, and also as one which will protect its contents and itself against adjacent or exterior fire, even though severe and widespread. This external hazard is quite as important, indeed often very much more important, than the danger against interior fire; for the burning of an adjacent structure is almost sure to prove a severer test than could possibly arise within a building in which the proper subdivision of areas and the treatment of vertical openings had been considered.

The most vulnerable points of attack are, of course, the exterior window openings, and it is plain that the efficiency of any exterior wall under fire-test will vary inversely as the number and the size of the openings in such wall. No construction can prove a more reliable fire-stop than a brick wall of adequate thickness and rigidity, but without openings. Such blank walls, however, are generally limited to party- or side-walls, abutting adjacent property, where windows cannot, of necessity, be introduced.

Modern requirements demand a maximum of light and air in office and other buildings, and windows have to be provided in all exterior walls, where possible; and even party- or side-walls, when the new structure is built to a greater height than the older adjacent building, are often pierced with windows.

The use to which the building is to be put will often influence or determine the number and size of the window openings. The office building demands a maximum, both in number and size, whereas the storage warehouse usually has few window openings, and these of limited area.

If our congested city areas of large and high mercantile buildings were *uniformly* of fire-resisting construction, there would be far less need of window protection than now generally exists. It is the usual promiscuous mingling of both good and bad construction that lends such an element of danger to the former through the shortcomings of the latter. Hence a building intended to be thoroughly fire-resisting must provide added precaution, and consequently incur added expense, to overcome the hazard occasioned by some more short-sighted owner who builds for his own convenience only, regardless of his duty to his neighbours or to the community.

Hence, under present conditions obtaining in all large cities, it is still necessary or desirable to provide fire-resisting window frames and sashes.

For very near or very severe exposures, some form of fire-resisting shutter combined with a fire-resisting window construction behind it is undoubtedly the best protection. For less severe exposures some of the window types to be mentioned later will probably suffice.

Prior to the year 1904, numerous fires in individual buildings had served to call attention to the necessity for window protection against dangerous neighbours or against existing hazards of various character; but it was not until the great Baltimore conflagration that the great value of *complete* window protection became fully apparent: for it was the general absence of protection at exposed wall openings that was responsible more than anything else for the spread of this conflagration.

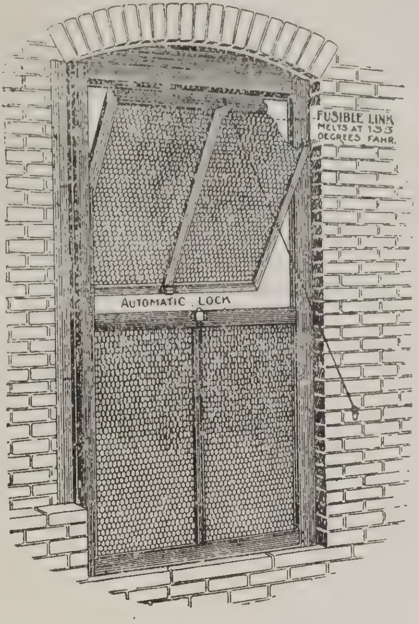


FIG. 1.—PIVOTED WINDOW WITH SHEET METAL FRAME AND WIRE GLASS.

The San Francisco disaster furnished a most noteworthy example of the efficiency of fire-resisting window construction—namely, in the Western Electric Building, where the installation of wire glass in metal sashes and frames for all exterior windows practically kept the building unscathed, although completely surrounded by fire and consequent ruin.

Considering now the various types adopted in current practice, it will be found that all methods of fire-resistance for windows may be divided into three groups of classifications—namely, water-jets or curtains, shutters, and metal or metal-covered frames and sashes in combination with glass.

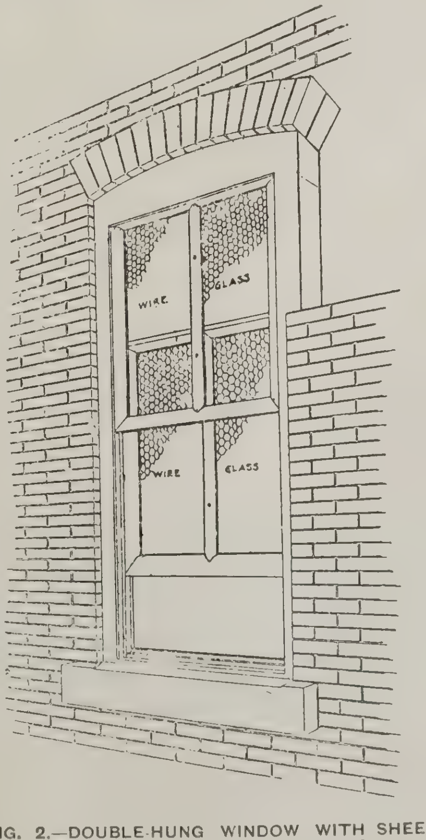


FIG. 2.—DOUBLE-HUNG WINDOW WITH SHEET METAL FRAME AND WIRE GLASS.

Water-Curtains.

These, although never adequately tested as to efficiency under severe conditions, are advocated by many as a practical means of preventing the passage of flames through window openings, &c. One great argument which has been advanced in their favour is the fact that water-jets can be installed at no very great additional expense if the building is equipped with a sprinkler system. Another argument in their favour is the fact that such an installation removes the necessity for the unsightly outside shutter.

Types of Shutters.

The ordinary types of shutters comprise (1) those made of wood, covered with sheet-tin; (2) those made of sheet-iron, stiffened at the edges by flat bars or angle-irons; and (3) rolling shutters made of corrugated or interlocking metal strips, arranged to slide up and down like a curtain.

Tin-covered Shutters

are usually made of two thicknesses of tongued and grooved $\frac{7}{8}$-in. boards, laid at right angles to each other, and nailed with wrought-iron nails, which are driven flush and clinched on the other side. The wood is then covered on both sides and edges with sheets of tin, lock-jointed together. When made in two leaves for the wide opening, the single boarding of one shutter should extend over that of the other shutter about 1in., so as to form a rebate or close joint. The shutters should be hung by hinges (firmly bolted through from side to side and not simply screwed into the woodwork) carried on the pins of iron hinge-eyes built into the masonry.

Iron Shutters

are made of flat or corrugated plates, riveted to flat bar or angle-iron frames, with horizontal bands also riveted to the sheets as stiffeners. Double thickness corrugated shutters are also sometimes employed, made of two sheets of corrugated iron (running at right angles to each other) and attached to angle-iron frames in such manner as to leave an air-space between the sheets. For very severe exposure this air-space may be filled with some non-conductor of heat, such as asbestos fibre.

Rolling Steel Shutters

are made in a variety of forms, depending largely upon the conditions to be met. The simplest type is made of a single sheet of highly tempered steel, with no hinges or rivets of any kind. Other forms are made by riveting together corrugated sheets of steel which are reinforced along the edges by means of metal strips or shields, to decrease the wear and friction in the iron guides, or by encasing wood slats in sheet-metal, with a layer of asbestos on the front between the wood and the metal casing.

In spite of the occasional failure of either one or all of these types of shutters under severe test conditions, it is beyond question that an approved form of fire shutter will offer the greatest possible amount of security for a window opening against fire hazard: because properly constructed shutters do not permit the direct passage of heat, as do various combinations of metal frames and wire glass.

It is probable that the standard tin-covered shutter will be found as effective under severe test as any single form of present-day window protection.

Decided objections to the extensive use of outside hinged shutters are their unsightliness and their annoyance to tenants; nor can the matter be remedied by placing the shutters on the interior of the building, as it would generally become difficult or impossible to operate them on account of the furniture or stacked-up merchandise preventing a rapid closing in time of need. For the rear or side walls of stores, warehouses, &c., outside shutters will generally be unobjectionable; but for principal façades or in buildings occupied by many tenants, either the appearance or the annoyance of their use would make their installation impracticable. Thus in office buildings it would be almost impossible to place window shutters and keep them closed, even were the appearance not objectionable. There could be no systematic method of closing them without giving serious cause for complaint on the part of those tenants who wished to use their offices for night work, while if there were not some inviolable rule regarding their closing, their presence would be useless. Hence, where appearance or practicability prevents the use of hinged shutters, recourse must be taken to some form of rolling shutter or to wire or prism glass in metal frames.

All types of rolling shutters may be arranged to coil in boxes either over, under or at one side of the opening, or in an external casing placed within a projecting cornice. The shutters may be made self-coiling up to 20ft. in width, without requiring any winding apparatus. They may be easily operated by means of a closing rod which hooks like a link at the exposed edge of the shutter. When rolled up they need not be noticeable, and when down they form a solid barrier of great efficiency, largely dependent, however, on the cooling of one side with water: for, without this, it is more than probable that most types of rolling shutters would so warp under severe heat as to become worthless.

If the exposure is not severe enough to require the use of hinged or rolling shutters, or if the appearance of shutters is objected to, then recourse may be had to a less efficient construction, but one of more pleasing appearance — namely, metal or metal-covered frames in combination with wire, prism or electro-glazed glass. Wooden window frames and sashes covered with sheet-metal are principally used for slight exposures where the danger from flying sparks is intended to be guarded against, rather than where any direct exposure is to be met: they are non-combustible rather than fire-resisting. A more efficient type is that where the frame and sashes are of sheet-metal or wrought- or cast-iron: these, indeed, when used in combination with wire glass, will ensure a construction as thoroughly fire-resisting as can probably be devised with glass.

In America hollow sheet-metal window frames and sashes comprise by far the greatest percentage of fire-resisting windows now in use. They are made of copper, galvanised iron, sheet iron, or sometimes of copper or bronze plated sheet-metal. The lights are usually of wire glass, either plate or maze, where light and appearance are essential considerations—or rough wire glass where it is desired to secure light without the distraction to the operatives of factories, &c., from outside sights. The details of construction of such frames and sashes, and the maximum permissible sizes of glass openings, are all fixed within certain limits by the rules and regulations of the National Board of Fire Underwriters. Figs. 1 and 2 show typical examples of pivoted and double-hung windows.

An extensive field for cast-iron window construction has been developed in the modern design of power houses, where large and high window areas are needed for light and ventilation. In such cases groups of sashes are connected by a system of vertical and horizontal operating rods which may easily be controlled from the floor level.

For monumental or thoroughly first-class fire-resisting buildings, where appearance is an essential consideration, nothing better can be used (either from the standpoint of finish or efficiency) than drawn-bronze sections for window frames and sashes. Such open or closed sections as the architect may desire for frames or sash (but without ornamentation) are "drawn" out of sheet-brass or bronze by pulling, on a "draw-bench," the plates of the required perimeter through special-made dies of the necessary shapes. Closed sections, such as the sash members, are made seamless by brazing the joints before "drawing."—Abstract of an article in the "Fireproof Magazine."

New London Fire-Station.—To the list of new London fire-stations must now be added the building just completed in Cannon Street. This takes the place of the Watling Street station and is to be opened on February 21st.

THE FIRE-TESTING PLANT AT COLUMBIA UNIVERSITY.

At Columbia University, New York, Prof. Ira H. Woolson has had installed a very complete fire-testing plant. It has now been in operation for three years, and since its establishment twenty-seven tests of full-size construction of floors, partitions, walls, &c., have been conducted. While the work done in the station has the approval of the university authorities, they are in no way responsible for its establishment and support; and although the plant is not under the jurisdiction of the Bureau of Buildings, it is at all times at its disposal, and most of the tests made there are in full co-operation with the bureau.

The advantage of this arrangement to the bureau lies in the fact that a well-equipped testing station is maintained ready for use, with all scientific apparatus and competent operators from the university to conduct the tests, which ensures an entirely disinterested report. On the other hand, the university is the gainer in the fact that by the approval of the Bureau of Buildings it is enabled to secure enough tests to keep the plant in existence and do the work in a thoroughly practical manner, which is a credit to the institution and a benefit as an educational feature.

The testing station now consists of three testing structures, with necessary sheds, &c. The small building is of reinforced concrete and used for partition tests, the side walls being the partitions tested. The size of it is 15ft. by 10ft. by 10ft. The larger or middle building is for floor tests. It is built of cinder concrete and is 22ft. by 16ft. by 10ft. in size. The other building is also for floors, but is built of brick, and is 15ft. square and 10ft. high. This is believed to be the only fire-testing station directly connected with any educational institution in the United States.

Ancient Fire Signs of the City of London.—The City Corporation has come into possession of a number of fire signs, or marks formerly used by fire-insurance companies on City buildings. The Guildhall librarian has placed them in position in the Guildhall Museum. In the collection there are also some property marks, including specimens from Christ's Hospital, the Bridge House Estates and the Poulters' Co.

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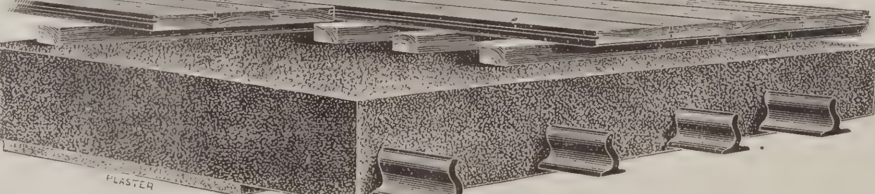

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THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
March 13, 1907.
FIRE SUPPLEMENT (MONTHLY).
Vol. XXV, No. 631. 6, Great New Street, Fetter Lane, London, E.C.

THE OLDHAM COTTON MILL FIRE.

Some Notes and a Criticism.

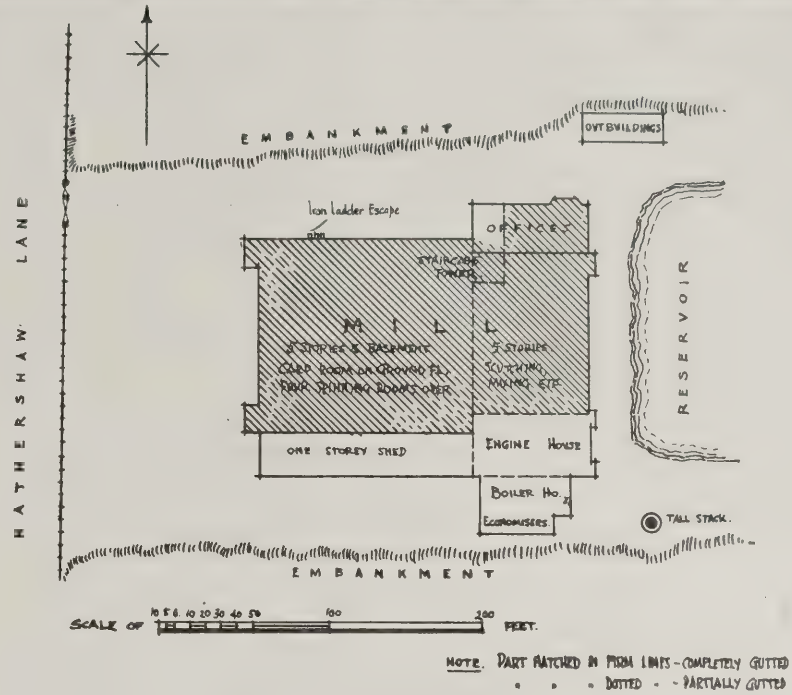
By Harold G. Holt.

The fire which occurred recently in the Oldham district, resulting in the complete destruction of the large mill of the Hathershaw Spinning Co., Ltd., was remarkable for several interesting points of construction, and the lessons to be learnt therefrom lead us to enquire further into the construction of the modern mill from a fire-resisting standpoint.

The fire broke out on the fourth floor of the mill on Friday afternoon, February 15th, endangering the lives of 300 operatives who were fully employed at the time. On the cry of "fire" being raised a stampede for the main staircase occurred on each floor, and this becoming jammed, rushes then ensued for the emergency doors leading to the *iron ladders* outside the building, down which men and youths escaped, happily without serious injury. The mill fire-brigade got to work with their donkey engine, but their efforts were useless, and when the Oldham Fire Brigade arrived, practically the whole mill was involved. The roof fell in shortly afterwards, and brought about the collapse of the two upper floors. The great heat caused the wrought-iron joists (of which the floors were partly constructed) and angle iron wall-ties to buckle, and at one point through this cause about 40yds. of brickwork came crashing down, several firemen narrowly escaping.

The Hathershaw mill contained about 77,000 spindles and occupied about an acre of ground. As will be seen from the accompanying plan, the premises consisted of the main mill (five storeys and basement), the card-room on the ground floor, with four spinning rooms over, and further to the rear the scutching, mixing and cotton rooms, also five storeys high. The offices (one storey) have been partially saved; the engine house, boiler and economiser houses and one-storey shed completely saved.

The mill was constructed with brick walls 3ft. 2ins. thick at the ground-floor piers, the windows having brick segmental arches over. The construction of the floors was a slight modification of a type commonly prevailing about 30 years ago, when the mill was built. The main girders were of cast-iron with cambered top flanges, the depth in the centre being 19ins., whilst at the ends it would not be more than 12ins.



SKETCH PLAN OF HATHERSHAW MILL.

A number of small stools or footsteps, equally spaced at 2ft.-11in. centres along the beam and projecting 2½ins. from the web, were arranged near the top flange to carry the ends of wrought-iron joists crossing each bay, which, in turn, were employed for the springing of flat brick arches between them. The arches were filled in with concrete, wood fillets being embedded in this to which the floor boards were nailed (see section). The roof was constructed in a similar manner, but covered with asphalt. A high parapet wall surrounded the mill above the roof level.

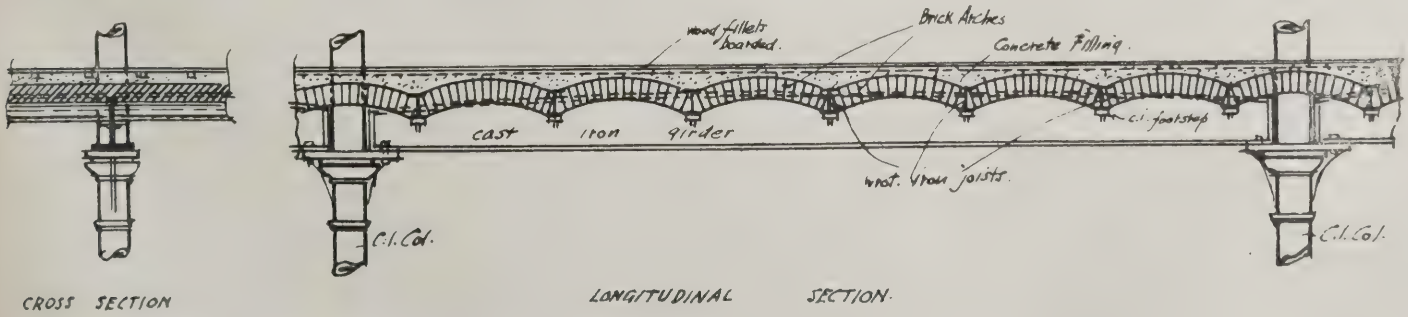
The Cause of the Fire.

The fire is known positively to have originated through friction at the headstock of a spinning-mule machine on the fourth floor of the mill. (It may be briefly explained that a spinning-mule consists mainly of a long moving "carriage," constructed of a wood frame on rollers, this frame carrying the spindles. The rollers and spindles require constant lubrication, and so it happens that a great deal of oil soaks into the wooden framing and into the floor boards; add to this the fact that thousands of yards of cotton yarn are constantly in use, with the air itself full of "fluff," and it will be readily seen that the whole situation is fraught with danger should an outbreak of fire occur.)

Lessons of the Fire.

There are many lessons to be learnt from this fire, both by architects, engineers, and mill-proprietors.

One of the most important is the value of a thoroughly efficient installation of automatic sprinklers. There were no sprinklers whatever at the Hathershaw mill, and it is not too much to say that, had there been a good sprinkler service throughout, the damage would not have amounted to more than about £5,000: the actual damage done is put at £50,000, but £60,000 would seem nearer the right figure. It should be pointed out, however, that sprinklers need constant inspection to ensure their efficiency; just recently a case occurred where the plugs of several sprinklers were fused by the heat of the mill, no outbreak of fire having occurred at all. Sprinklers need to be used in conjunction with a good system of fire-resisting con-



SECTIONS SHOWING FLOOR CONSTRUCTION AT THE HATHERSHAW MILL.

struction. This fact is recognised by the Fire Offices, who grant a rebate of about 30 per cent. where sprinklers only are in use, but about 60 per cent. for what is called the "fully protected" class of mill—*i.e.*, one in which the floors are fire-resisting and where fireproof doors, &c., &c., are employed.

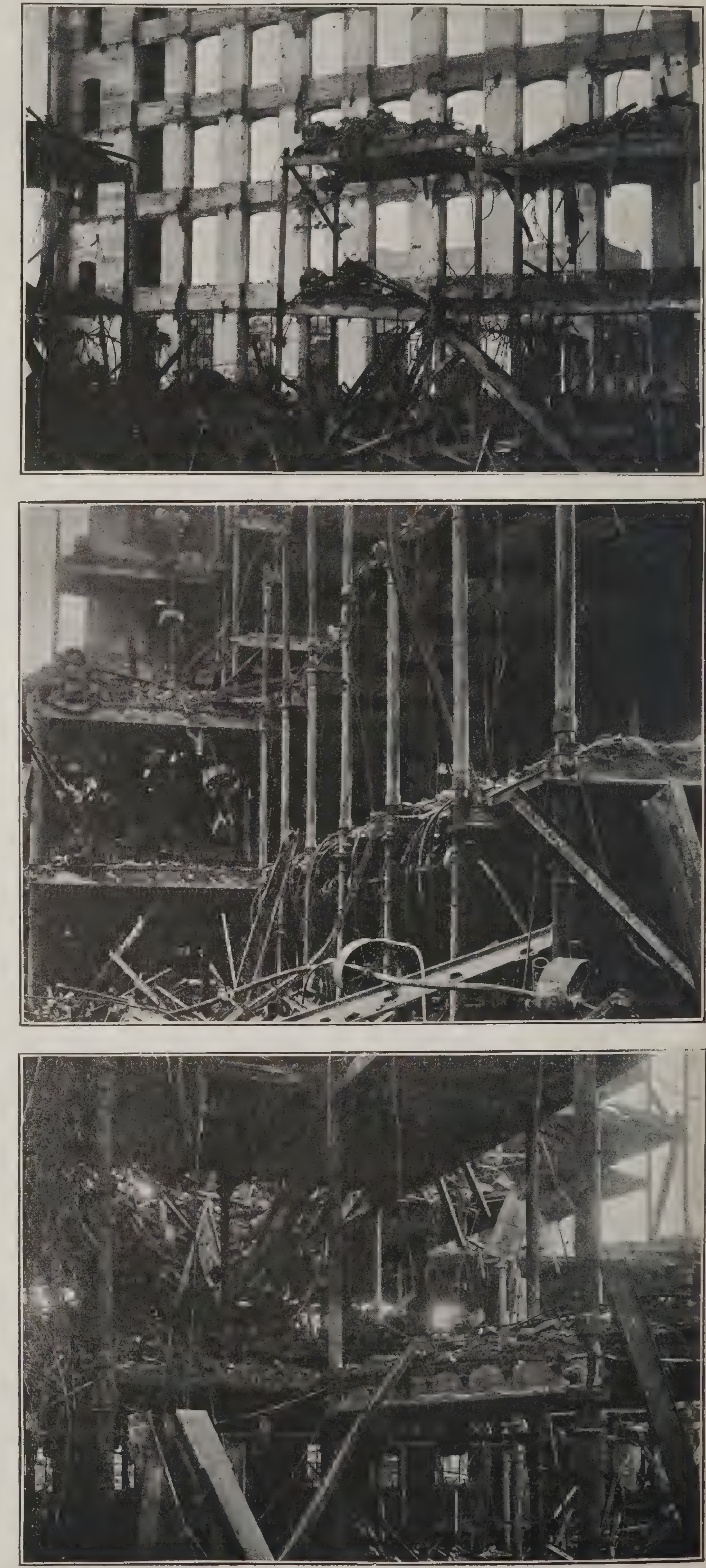
With regard to the type of floor used in this mill, very little inspection will show that the unprotected main cast-iron girders would fail in any fire where they were subjected to water, and that the wrought-iron joists would soon twist and buckle, disturbing the equilibrium of the arches; once one of these had failed, down would come the remainder in that row like a pack of cards; in fact, the rapidity with which the floors failed one after another shows this to have been the case at Oldham. The construction of the floors was bad from a fire-resisting standpoint, as also the method by which the main beams were supported at intermediate points. I refer to the unprotected cast-iron columns. The testimony of eye-witnesses and subsequent inspection prove without a doubt that the collapse of the floors was greatly hastened by the repeated failures of the columns. Mill architects on the whole abandoned this type of floor construction years ago, but they continue to employ the cast-iron columns which have all along been quite as much responsible for failure in fires as any system of floor construction. I admit that there is something to be said for cast-iron columns in mill work. They are cheap, easy to handle, and very convenient where odd angles occur in the bays, and they do not take up much space. Their use has, however, to a great extent become their abuse. If it is imperative that they should be used, it would at least be wise to allow a higher factor of safety than is usually adopted—that is, to permit a greater margin in thickness of metal, and, in addition, it would be well to use some form of protection, preferably concrete.

Lintels and Wall-Ties.

Before concluding, I should like to point out that the extensive use of cast-iron lintels in mills (and other buildings) over large openings 15ft. or 16ft. wide, and also of cast-iron mullions supporting them in the centre, is to be strongly condemned; not, perhaps, so much as the use of cast-iron columns, but there is extra risk in lintels over window openings due to the water from hose-pipes in case of fire.

Another matter requiring attention is the use of wall-ties at the wall end of main girders. Angle irons were carried continuously round the walls at the various floor levels of the Hathershaw mill, and the fact that comparatively so little walling remains standing is, no doubt, to be attributed to these ties buckling, as much as to the twisting of the wrought-iron joists. It is a fairly common practice to employ short lengths of wrought-iron rods at the ends of steel main joists to anchor them in the wall, and (especially in cases of unprotected steelwork) should fire occur the buckling of the beams would result in the dragging over of parts of the brick piers by these rods.

A great boom in the building of cotton mills (especially in Lancashire) has taken and is taking place, but in many cases these mills are far from perfect as regards protection from fire. It is to be hoped, therefore, that this fire at Oldham will be carefully taken note of by mill architects.



Photos: Dyson, Oldham.

THE HATHERSHAW MILL FIRE.

THE NEW CANNON STREET FIRE STATION.

On the site of the building which was formerly occupied by the General Electric Co., with frontages to Queen Victoria Street and Cannon Street, now stands what may be assumed will be for some time to come one of the most representative fire-stations of the City of London. The building was formally opened on February 21st.

Whatever may be the opinion as to the extravagance of the past London County Council, one thing is certain, that their expenditure on fire-stations is always excluded from any condemnation, and that, in fact, the policy of the Council in erecting first-class fire-stations was a good one.

With the completion of this new fire-station, to be known as the Cannon Street Fire-Station, the programme of rearranging the fire-stations of London is practically concluded.

During the past eighteen years additional fire-stations have been established at Dulwich, New Cross, Kingsland, Whitefriars, Lewisham, Shepherd's Bush, West Hampstead, East Greenwich, Perry Vale, Homerton, Highbury, Vauxhall, Pageant's Wharf (Rotherhithe), Streatham, Kilburn, Bayswater, Eltham (Burdett Road), Mile End, Wapping, Northcote Road (Battersea), Herne Hill, Lee Green, and North End (Fulham).

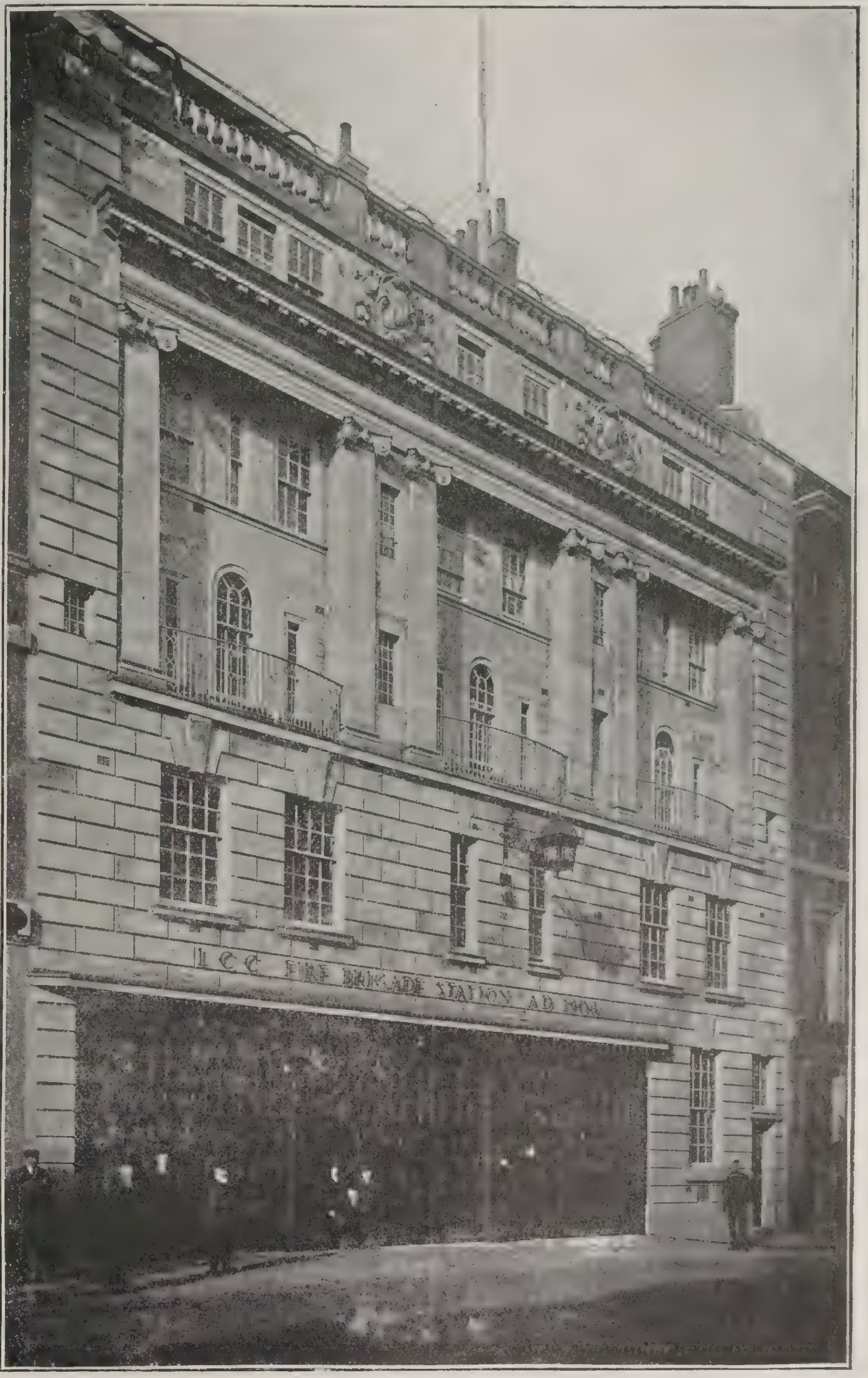
Of these, the Vauxhall, Kilburn, Bayswater, Eltham (Burdett Road), Herne Hill, and North End stations are sub-stations.

New stations have been erected, in substitution for small and inconvenient buildings, at Wandsworth, Shoreditch, Fulham, Brompton, Islington, Paddington, Redcross Street (City), Euston Road, Clapham, Mile End, Deptford, Old Kent Road, Millwall, Kensington, Westminster, Brixton, and now in Cannon Street, and the existing stations at Kennington, Rotherhithe, Clerkenwell, Hampstead, Battersea, Whitechapel, Greenwich, and Stoke Newington have been very considerably enlarged. Two small stations without horses have been established in Battersea Park Road and at North Woolwich respectively. A building has been erected at Rotherhithe for the accommodation of the staff of the Cherry Garden river-station, and another building has been erected at Battersea for the accommodation of the staff of a river-station which has been established there.

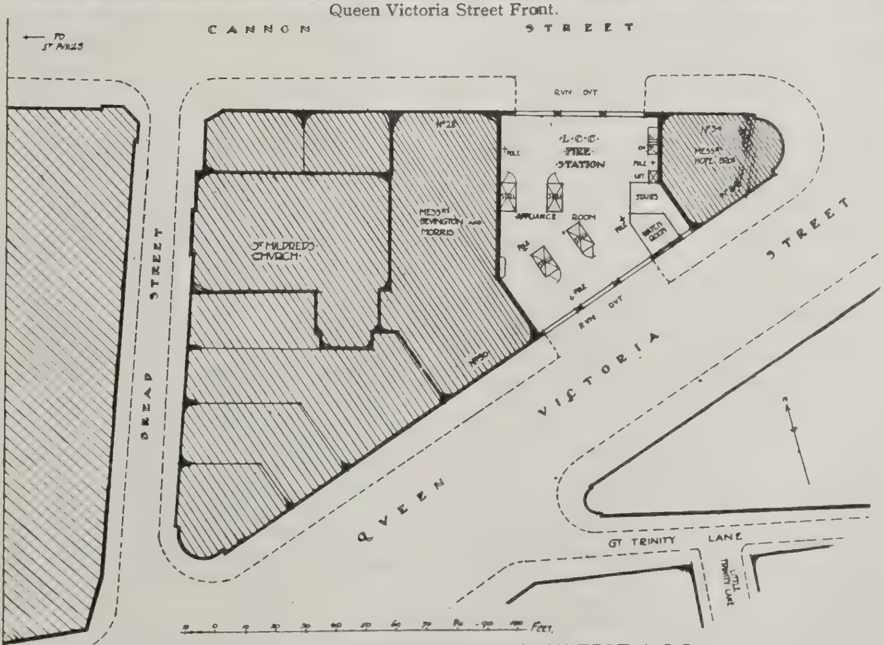
New stations in substitution for existing stations are in course of erection at Knightsbridge and Tooting, and additional sub-stations are being erected at Plumstead and Hornsey Rise. The Bethnal Green station is being considerably altered and enlarged. The Council has also determined to erect new stations in substitution for existing inconvenient buildings at Holloway, Waterloo Road, Shooter's Hill, and North End, Fulham, and to build additional sub-stations at Charlton, Caledonian Road, Brixton Hill, Camberwell New Road, Roehampton, Balham, Brockley and Earlsfield, the building work in connection with the first-named of these stations being about to be commenced.

Not only have these new fire-stations, or modernised fire-stations, been re-equipped, but most of the stations are now double-banked stations—*i.e.,* they have two appliances ready-horsed to turn out.

As to the new Cannon Street station,



Queen Victoria Street Front.



W. E. RILEY, F.R.I.B.A., SUPERINTENDING ARCHITECT, L.C.C.

every device that could ensure a rapid turn-out has been thought of, and it will probably serve for many years to come as a model to the country. The arrangements at this station are as follows :—

1. Alarm bells are placed at the Cannon Street and Queen Victoria Street entrances, their positions being distinguished by tablets, which are brightly illuminated at night.
2. Instantly the call is given, electric bells ring and electric lights show automatically throughout the station.
3. The men at once slide into the appliance room by means of the numerous sliding poles so arranged as to land each man as close as possible to his post of duty.
4. Simultaneously, the officer on watch, having ascertained the locality of the fire, indicates to the men by coloured lights on the ceiling the appliances that are to turn out.
5. The doors to the horse stalls have also been opened automatically, and the trained horses have run into their places alongside the appliances. The harness, already suspended, descends upon the horses, it is fastened together, the doors spring open, and loud alarm bells on the front of the station warn passers-by that the appliances are passing out.

The whole of the ground floor is given up to the appliances, with the exception of the "watch room." This room is occupied night and day, and is in direct electrical communication with all parts of the station. It governs the appliance-room on the one side and the approach to the residential portion on the other.

The appliance-room is paved with ironstone paving, with panels of stable bricks in front of the appliances, and is heated by radiators. Six sliding poles deliver from the upper floors into this room.

Above the ground floor the building is divided into two blocks connected by bridges at the various floor levels. The first floor is given up to the single men, who are thus always in the closest possible proximity to the appliances. Each man has a separate cubicle, with window, bed and table. There is a large recreation-room with space for a full-sized billiard-table, and a mess-room and scullery. The lavatory and bath arrangements are also on a complete scale.

On the second floor, the Queen Victoria Street block contains the remaining nine single men's cubicles (heated by radiators), with lavatory, bathroom and w.c.'s complete, and has two sets of sliding poles in connection with the appliance-room; while the Cannon Street block provides accommodation for the station officer and one set of firemen's quarters, with two rooms, scullery, bath and w.c. A small office for the station officer opens off the landing.

On the third floor, the Queen Victoria Street block provides two sets of married quarters, one of three rooms, with scullery, bath and w.c., and one of two rooms and offices; while the Cannon Street block contains two sets of married quarters, each with three rooms and offices.

On the fourth floor the Queen Victoria Street block contains the wash-house and drying-room (fitted with six drying horses) and a spare bedroom, and the Cannon Street block contains two sets of three-room quarters.

The staircase, which is adapted externally for hook ladder drill practice, continues up to the flat roof, which is planned as a playground for children and protected by wire guards. A flag-staff is erected on each front.

The hoist for storing and drying hose is in the corner of the building on the west wall, and runs from basement to roof. The basement extends over the whole of the site under the appliance-room, and the various stores, &c., are accommodated here, together with four drying horses, stokery and boilers for the heating apparatus. The old vaults under the pavement have been converted into coal stores.

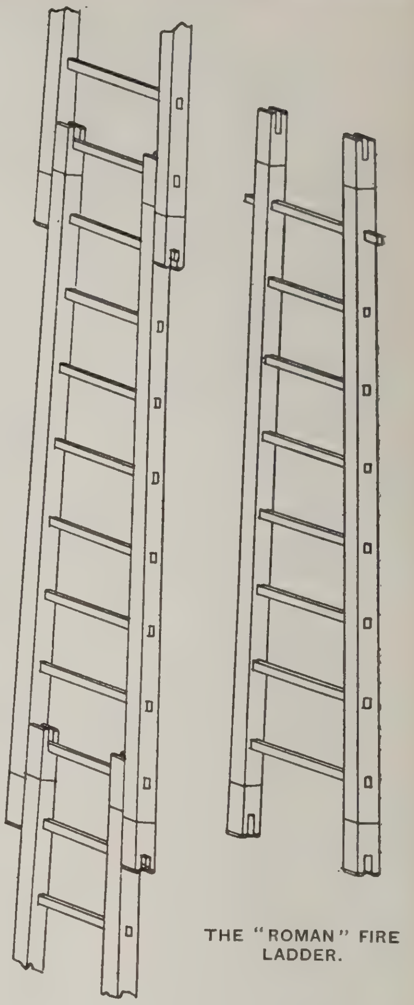
The elevations are carried out in Portland stone throughout, from the designs of Mr. W. E. Riley, F.R.I.B.A., Superintending Architect to the London County Council.

FIRE-PROTECTION ABROAD.

Some Useful Hints to Architects.

Architects who go on the Continent, and to Italy in particular, usually devote themselves solely to studying architectural work from the art side only. It is therefore quite exceptional when we find an architect or student devoting himself in part to studying the constructional aspects of the architecture of the country. Thus it is that architects as a body pay little attention to the advancement in fire-protective construction abroad, or to the advancement in the equipment of buildings from the fire point of view—a subject which is constantly coming within their purview, whether they be in private practice or holding public appointments.

We welcome, therefore, the appearance of a report by a Special Commission of the British Fire Prevention Committee that visited Italy and certain German and Swiss cities last year. This report deals with some of the aspects of construction and equipment to which attention is rarely paid, and though, of course, the visit of the Commission was to a very considerable extent devoted to matters of fire-protective organisation, outside our scope, and the question of fire-appliances, the report contains much useful reading for architects, this being probably due to the fact that there were three architects and one district surveyor on the Commission.



THE "ROMAN" FIRE LADDER.

The cities visited in Italy were Venice, Florence, Rome and Milan, and on the way to Italy, or on the return journey, Lucerne, Zûrich, Bâle, Strassburg and Mülhausen were also visited. The Commission had every facility at their disposal. They were nearly everywhere the guests of the public authorities, and everything was thrown open to them.

We will now deal with such parts of the report as we think of use to architects.

"ROMAN" FIRE LADDER APPLIED TO DANGEROUS-STRUCTURE WORK.

Architects as Fire "Authorities."

Under "Impressions in Italy," the report says it was found that the public authorities seemed to be much impressed with the necessity for systematic fire-protective measures. It was observed that the fire-protective questions on the structural side were dealt with to a considerable extent by the professional officers of the fire brigades, and that these professional officers were, as a rule, engineers or architects by training. Of course we are gradually finding the fire services in our local townships being put into the hands of the borough surveyor, and many a borough surveyor or his assistant now mainly controls the planning of new structures within his area, and he has a great deal to do with the fire-protection of that area in a general sense.

Seeing that this tendency towards putting matters in the hands of men who are architects, surveyors or engineers by training seems to be growing, not only in our country, but all over the world, it is to be hoped that our educational facilities for architects and surveyors will soon pay greater attention to the matter of fire-protection than is the case at present, and that the young architects who do not feel themselves quite qualified to take up the art side of their profession may be induced to interest themselves in some of the practical aspects, such as that of fire-service, and eventually become either borough surveyors in charge of local fire services, or fire chiefs.

Substantial Construction in Italy.

A matter that seems to have impressed the Commission was the substantial character of the construction of the domestic and business premises, which accounts for the limited extent of the fires in the principal cities of Italy. Of course our regulations are comprehensive ones for limiting neighbouring fire-hazards, but those for the interior of buildings are too little considered; for this reason it is interesting to observe that in a country like Italy there is much good construction inside ordinary buildings, that the staircases throughout are fire-resisting, and that practically everywhere the lower ground floor, whether used for living purposes or as a shop, is separated from the remainder of the building by a good fire-resisting floor.

British Fire Equipment in Italy.

It is pointed out among the "Impressions" that British fire appliances continue to be used in Italy, and it is suggested that British makers should specially lay themselves out to meet their requirements, for it is in Italy that the value of a well-made British article is thoroughly appreciated. This is a point to which we would call the attention of the trades allied to building construction. The British sprinkler, the British fire door, and the British fire-engine would have a good field in Italy.

A good Builders' Ladder.

Attention is called to the value of what is called "the Roman fire ladder" for dangerous-structure work, scaffolding and steeple work, and we would certainly refer contractors and others to an able description of this ladder written by Mr. Max Clarke, F.R.I.B.A., and carefully illustrated, which shows to what useful purpose this ladder is put. It is certainly a remarkable appliance and of the simplest possible character; it could be used to a very great extent by contractors, painters, steeple-jacks, &c. The ladder can be raised to a height of 164ft. Not being subject to any proprietary rights, it is open to our building trades for use.

DANGEROUS-STRUCTURE TRAP, FLORENCE.

Dangerous Structure Trap.

All who have had to deal with dangerous structures in the metropolis, whether district surveyors or architects, will have noticed the primitive way in which we go to work in selecting our appliances, &c., for dangerous-structure jobs. In a former "Fire Supplement" we illustrated a dangerous structure trap in Munich. Here we show one used in Florence. It is really time, no matter what economies are practised, that some thoroughly well equipped dangerous-structure trap be provided ready for immediate turn-out, whether from the Works Department, or from some other department of the London County Council. We believe that thereby much property could be saved.

Supervision in Switzerland.

Building construction in Switzerland is described as of "fair" quality, but the small number of fires is mainly attributed to the control and careful supervision of all possible causes of fire-hazards, such as open lights, chimney flues, hearths, &c. Seeing the acknowledged danger of flues and hearths, one might well think whether it would not be possible, without undue interference with private rights, to encourage some inspection in this direction within our own borders. We observe the insurance companies do some inspection in certain classes of risks, but what we refer to is a more comprehensive form of supervision.

Modern Risks.

It is interesting to note that in Switzerland one of the brigades is equipped with appliances to meet the ever-growing hazards of modern risks, such as those of electric lighting and power, and even the older ones such as gas. All architects and surveyors who have attended a fire will recollect the trouble that sometimes arises where there are high-tension currents, or where there is a big broken gas main, and it certainly appears to be useful that the necessary appliances to meet these hazards should be easily available. Architects engaged by large corporations to look after their buildings should bear this in mind, for there is no reason why the necessary safety appliances should not be easily available in big manufactories, stores, &c., quite irrespective of whether they are carried by the brigade or not.

Theatre safety at Mülhausen.

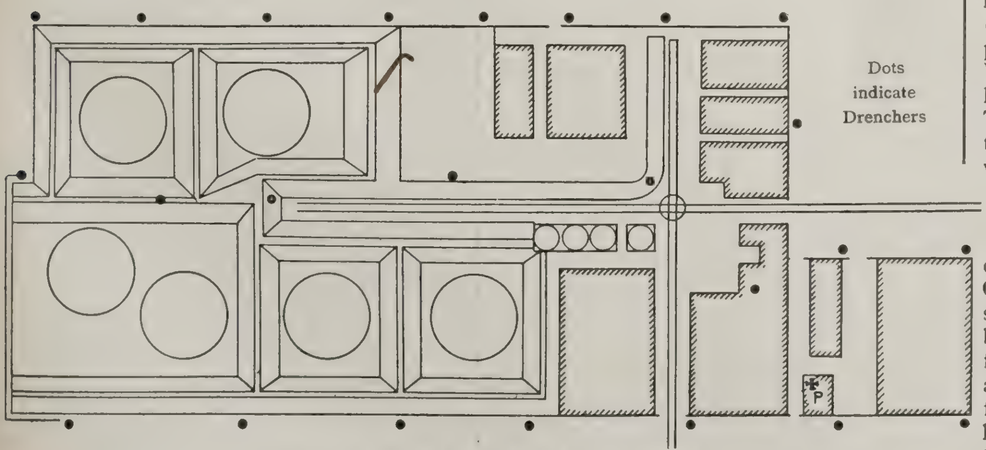
A point that appears to have struck the Commission was the strength of the fire-resisting curtain at the theatre at Mülhausen. This is a point to which we consider insufficient attention has been paid.

Museum Protection.

Among the individual structures referred to in the Commission's report, not strictly in connection with fire-protection or on economic points, we observe with interest that very systematic protection is accorded to the museum at Milan. No doubt this is the result of the disastrous fires at Turin and the Vatican, but it is always well to mention a matter of this kind, having regard to the many valuable museums and galleries we have in our country, and the new ones that are constantly being erected.

Petroleum Stores at Venice.

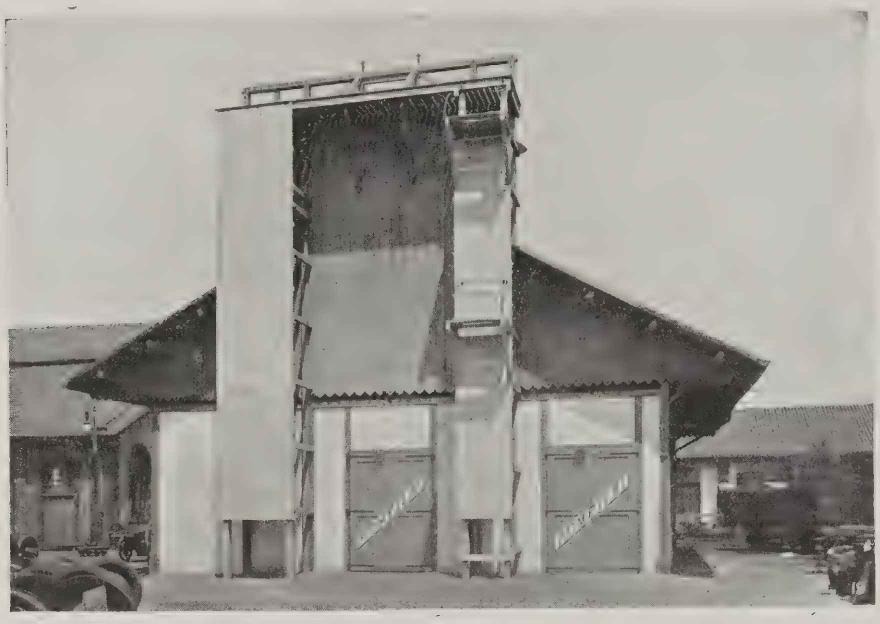
It seems unlikely that one should go to Venice to study the question of petroleum storage, but the fact remains that one of the best petroleum stores ever planned in Europe is to be found there. We reproduce a plan showing the excellent manner in which isolation is secured. The walls, it should be added, are all protected by powerful drenchers, which revolve automatically.



PLAN OF PETROLEUM STORES AT VENICE

Milan Exhibition.

The exhibits at this Exhibition are dealt with at some length by Mr. Percy Collins and Mr. James Sheppard, and they seem to advocate for International exhibitions a better "collective exhibit" as far as Great Britain is concerned. An actual building exhibit of great interest from the fire point of view was an excellently-designed aquarium constructed entirely of reinforced concrete.



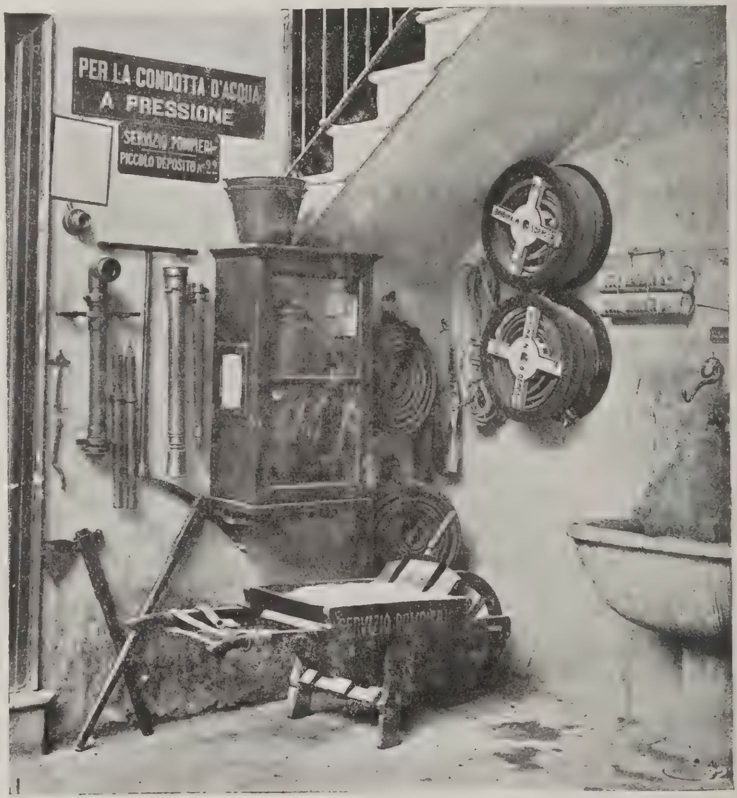
A CHEAP ITALIAN FIRE-STATION AND DRILL SHED.

Protection of Large Works.

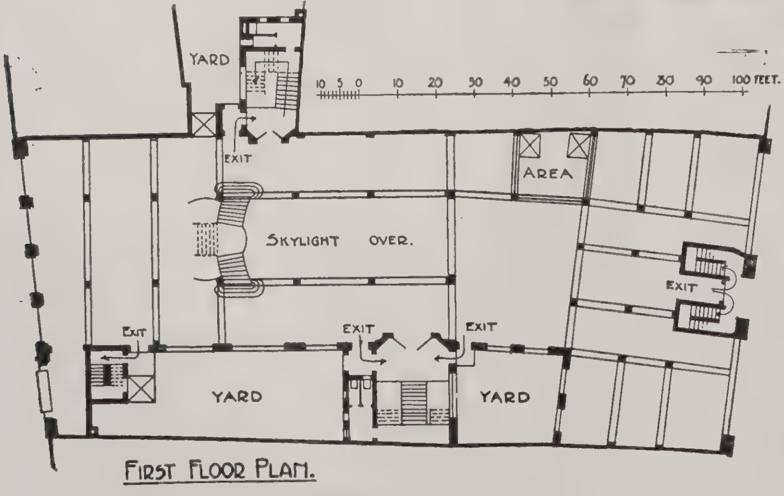
The large works in the North of Italy seem to be very amply protected in respect of fire. We illustrate the first-aid outfit of a typical Italian factory, that of Messrs. Pirelli, from which it will be seen that considerable attention is paid to the provision of sand for extinguishing purposes, and that while the ordinary appliances are kept in the open, ready for use, the chemical extincteurs are kept under glass. These are points to remember when fitting up first-aid batteries in factories, asylums, and other similar buildings. We also illustrate a typical factory fire station, with drill house and water tower, about the most economical building we have seen, as it could possibly be erected for a little over £100.

The new Stores at Strassburg.

Stores of the Harrod's type seem to be springing up all over the Continent, and it is interesting to observe that although the authorities do not limit cubic extent, they lay special stress on the exit facilities. We illustrate a plan of a store in Strassburg as showing the numerous exits in all directions for getting the public out in case of an outbreak of fire. The argument of the public authorities is that safety of life is of the chief consideration, and that given good facilities for life-saving, other restrictions, such as those of cubic extent, are waived.



FIRST-AID OUTFIT AT MILAN FACTORY.



PLAN OF STORE AT STRASSBURG, SHOWING EXIT STAIRCASES.

FIRE-RESISTANCE OF CONCRETE AGGREGATES.

A Commission to Investigate the Matter.

Having regard to the confusion existing as to concrete aggregates, and the absence of their exact specification, the Executive of the British Fire Prevention Committee announce that they have formed among the members of the Committee and representatives of the public authorities subscribing to the Committee, a Special Commission of twenty-two members to report upon and define the aggregates suitable for concrete floors intended to be fire-resisting, having due regard to questions of strength, expansion, and the chemical constituents and changes of the aggregates.

In forming the Commission it has been considered of importance that the various technical interests should as far as possible be represented.

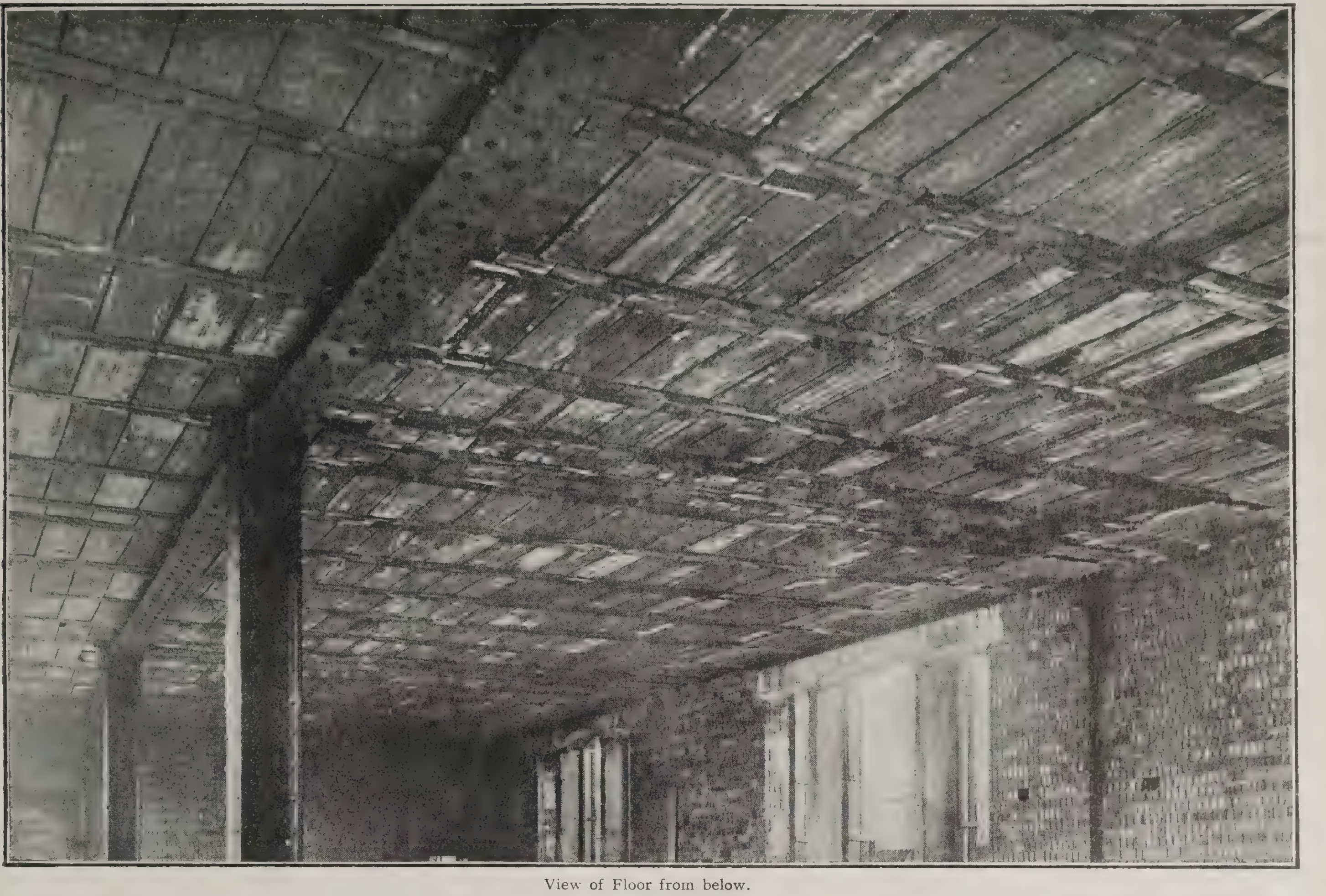
Sir William Preece, K.C.B., F.R.S. (past-president of the Institution of Civil Engineers, late chief engineer to the General Post Office), will act as chairman; Mr. Matt. Garbutt, F.R.I.B.A., A.M.I.C.E., will act as hon. secretary; and the following are members of the Commission:—

Representing the Admiralty:
C. H. Colson, M.I.C.E., superintendent civil engineer.

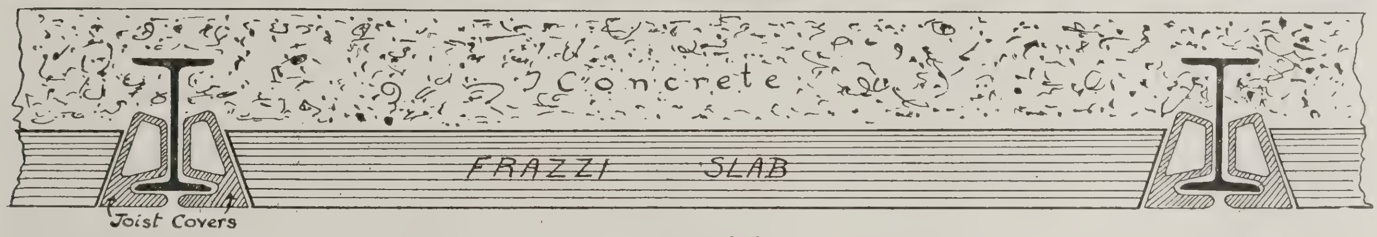
Representing the War Office:
Col. A. H. Bagnold, R.E., superintendent of building works at Woolwich Arsenal, and
Major R. N. Harvey, D.S.O., R.E.

Representing the Metropolitan Asylums Board:
W. T. Hatch, M.I.C.E., chief engineer.

Representing the Norwich Corporation:
A. E. Collins, M.I.C.E., city engineer.
H. K. G. Bamber, F.C.S., cement manufacturer.
F. S. Capon, assistant architect, L.C.C.



View of Floor from below.



Cross-Section of Floor.

"FRAZZI" FLOORS AT THE PICCADILLY HOTEL, LONDON.

J. Herbert Dyer, senior vice-president National Fire Brigades' Union.
Max Clarke, F.R.I.B.A.
F. W. Hunt, F.R.I.B.A., surveyor to the Portman Estate.
W. H. Hunter, M.I.C.E., chief engineer to the Manchester Ship Canal.
Ellis Marsland, district surveyor.
E. G. Rivers, M.I.C.E., chief engineer to H.M. Office of Works.
Jos. Randall, A.M.I.C.E., contractor.
A. Ross, M.I.C.E., chief engineer to the Great Northern Railway.
J. W. Restler, M.I.C.E., deputy chief engineer to the Metropolitan Water Board.
Edwin O. Sachs, F.R.S.Ed., chairman, British Fire Prevention Committee.
James Sheppard, A.I.E.E., chief surveyor to the North British and Mercantile Insurance Co.
Frank Sumner, M.I.C.E., city engineer to the Corporation of London.
J. Winn, Lieut.Col., R.E., late of School of Military Engineering, Chatham.

The services of Mr. Cecil H. Desch, D.Sc., Ph.D., have been retained for any chemical research work required during the enquiry.

The first meeting of the Commission was held on Wednesday last, March 6th, Sir William Preece presiding.

"FRAZZI" FLOORS AT THE PICCADILLY HOTEL.

The "Frazzi" floors at the Piccadilly Hotel, now in course of erection, are of the lintel type, consisting of terra-cotta slabs, mostly 3ft. 4ins. long, with bevelled ends resting on skew-backs or joist covers. These latter embrace the lower flanges of the joists (as shown by the section above), with the view of affording protection against fire of ordinary duration. The joist covers are made in various sizes so as to fit all widths of flanges, from 1¾ins. to 6ins., and the spans between joists (centres) vary according to these widths. The slabs have four hollows longitudinally, and the terra-cotta of which they are made is in no part more than $\frac{7}{16}$in. thick. The weight of the terra-cotta floor without the steel is only 10lbs. per sq. ft.

Upon the slabs breeze-concrete is used as a filling, reaching above the top flange of the joist, where paved floors are to be laid, but not more than 3ins. thick where floor battens and floor boards are used.

The terra-cotta floor, 3ft. 6ins. span, without the filling, has been tested by Messrs. Kirkaldy & Co. and found to break with a distributed load of 8½cwts. per foot super. The strength and resistance to shock is much increased by the breeze-concrete filling; the steelwork is also reinforced considerably by filling concrete well into the webs between the upper flange of the rolled-steel joists and the terra-cotta joist covers.

The flooring is fixed with great rapidity, one bricklayer being able to set from 20 to 30 sq. yds. per day.

The terra-cotta, while being of great strength, has the property of being easily sawn with a handsaw. In consequence of this there is little waste and no difficulty in making up odd-shaped portions of the flooring, or irregular spans. This is a very important advantage.

The Position in regard to St. Paul's Cathedral.—Sir Aston Webb, Mr. Belcher, and Mr. Collcutt, the Committee inquiring into the state of the cathedral fabric, will probably not deliver their report for six months. They have not so far found anything alarming. They are sinking some borings in the neighbourhood of the church with the view of ascertaining the effect of the sewer which the London County Council projected in that direction, but these cuttings are as yet only 16ft. down. Before they are of value they will have to be sunk 50ft. So far only the porch on the south-east is affected by any settlement. The damage is so slight that it can only be detected by very exact instruments.

FIRE-RESISTING STAIRCASES AND ROOFS OF SHOPS.

Some Correspondence about the London Building Act.

We publish below some correspondence which would scarcely otherwise reach the eyes of architects, as we have only so far traced its full publication in the "Drapers' Record," in which journal it is published in connection with the proceedings of the Drapers' Chamber of Trade.

It appears that the secretary of this Chamber of Trade communicated with the London County Council on the matter of the enforcement of the Building Act Amendment Act, and drew from the Council a reply over the signature of Mr. Riley, the superintending architect.

This reply seems to indicate that either it was Mr. Riley's intention, or the intention of the Chairman of the Building Act Committee of the previous London County Council, to be as lenient as possible in the matter of the enforcement of the Amendment Act, for the letter states that every endeavour is being made to relieve owners of the cost and inconvenience involved in carrying out the literal provisions of the Act.

We certainly would ask—Why was the Act drafted by the L.C.C., pushed by the L.C.C., and got through Parliament, if it is suddenly not the intention to properly enforce it?

The Amendment Act is an exceedingly good one in the interests of the safety of the metropolis. There is scarcely a provision in it which, if reasonably carried out, could be termed a hardship, but there is a great difference between the reasonable administration of an Act and of endeavour that is being made to relieve owners of the cost and inconvenience involved in the carrying out of its provisions.

We are fully aware that Mr. Riley takes a most reasonable attitude in the execution of his duties, but it would almost appear as if this letter were one that, in its leniency and by its date of publication prior to the recent election, was intended by the past Building Act Committee more as a sop to the elector than an indication of its intention to properly carry out the duties imposed upon it by the Act of Parliament.

It would have been preferable to have sent this letter above the signature of the chairman of the defunct London County Council's Building Act Committee, but all who realise the position in which public officials have to be placed will, of course, quite understand that whilst only reasonable wishes are put forward by the Superintending Architect, it is not he, but his late committee, who were endeavouring, prior to the election, to almost promise a leniency which would be extraordinary.

Drapers' Chamber of Trade,
155 and 156, Cheapside,
January 31st, 1907.

RE LONDON BUILDING ACTS (AMENDMENT) ACT, 1905.

Sir,—Your letter to Mr. B. B. Evans, chairman of the Building Act Committee of this Council, has been submitted to, and considered by, my Council, and on its behalf I have pleasure in forwarding for your kind consideration the following suggestions, viz.:—

(1.) A fireproof exit from a staircase through a shop should not be insisted upon except in cases where risk of loss of life is great, and there is no other means of exit. The frontage of shop property in London is very valuable, and owing to the enormous rents imposed on leaseholders the curtailment of shop frontage would be a very serious loss, and in many cases would result in ruin to the business.

(2.) There is no urgent reason for the roofs of projecting shops being made fireproof where there are other exits.

(3.) In small projecting roofs (say, between 7ft. and 10ft.) it is very difficult to obtain the necessary light for the shop. This being so, subsection 2 of section 10 ought not to be strictly adhered to. An asbestos or fire-resisting screen erected between the lantern light and the main building would be sufficient.

(4.) In existing buildings, in addition to the usual staircase, a means of exit to the roof as provided by the Bill is all that should, in the vast majority of cases, be insisted upon by the Council.

My Council desires to call attention to the fact that, although it was originally the intention of the London County Council that the bulk of the cost of the necessary alterations should be borne by the owner, yet the words "regard being had to the terms of any lease or contract affecting such building" which appear in section 20 of the London Building Acts (Amendment) Act, 1905, will remove the obligation from landlords, and place it upon thousands of occupiers, as the provisions contained in ordinary leases of business premises are so worded as to cast the whole responsibility upon the lessor. This being so, my Council respectfully submits that the requirements imposed by the London County Council under the Act should be as lenient as possible, owing to the fact that the burden imposed upon the retail traders of London by way of rent and taxation is already exceedingly onerous.

I am, Sir,
Your obedient servant,
Jos. R. Quilter, Secretary.

Mr. H. R. Taylor, London Building Act Committee, Spring Gardens, S.W.

London County Council,
County Hall, Spring Gardens, S.W.,
February 6th, 1907.

LONDON BUILDING ACTS (AMENDMENT) ACT, 1905.

Sir,—In reply to your letter addressed to Mr. H. R. Taylor, the Chairman of the Building Act Committee, London County Council, dated the 31st ultimo, which has been handed to me for reply, I venture to point out that every endeavour has been, and is being, made to render the requirements of the Council with regard to means of escape as lenient as possible, both from the point of view of cost and inconvenience. Taking the specific points raised in your letter:—

(1.) I am not aware of any case in which a fireproof exit has been required through a shop unless there has been no other possible means. The point you make with regard to the value of the frontage has always been borne in mind.

(2.) It is quite clear that in many cases the best way of arriving at the intention of the Act will be to adopt some other method than that of rendering the roofs of projecting shops fireproof. Every endeavour is made to relieve the owners of the cost and inconvenience involved in carrying out the literal provisions of the Act, and, out of upwards of 1,300 cases, where applications have been made for exemption, it has been found possible, in a large majority of cases, to secure the safety of the occupants in other ways than that of rendering fireproof the whole or even part of the roof.

(3.) In a very few cases has it been necessary to remove the skylight from the main front of the building. It is generally found that when anything at all has to be done to the skylight the difficulty is often overcome by re-glazing it with fire-resisting glass, which would appear to be better than an asbestos fire-resisting screen such as you suggest.

(4.) In existing buildings occupied by more than 20 persons the means of escape required by the Council will largely depend upon the size and arrangement of the buildings and the number of people who occupy them.

Careful consideration will be given to the value of the means of access to the roof before making requirements to provide other means of escape, as required by the Act.

The most scrupulous care is being exercised to provide the means of escape intended in the least troublesome and least costly manner, and it will be found on inquiry that the aims of your Committee's letter have in every case, where possible, been anticipated.

I am, Sir,
Your obedient servant,
W. E. Riley,
Superintending Architect.

The Secretary, Drapers' Chamber of Trade,
155 and 156, Cheapside, E.C.

FIRE TESTS.

The last testing day of the British Fire Prevention Committee was devoted entirely to trials with fire-extinguishers, the Minimax appliance being under investigation. A long series of tests was undertaken, about eighteen in all, the arrangements being entrusted to a special sub-committee, with Mr. Percy Collins, F.S.S., as directing member; there was a large attendance of architects, insurance surveyors, Government officials and fire-brigade chiefs. As in the case with previous tests with fire-extinguishers, these will be continued at a later date with various re-tests and the like, and no report may be expected before Easter.

Other tests are in hand with appliances, and an interesting series is to be attempted in connection with a safety device for petroleum storage—a matter of considerable importance to architects, having regard to the fact that stables are being superseded to such an extent by garages, and that petrol storage in works is becoming a very important provision for which arrangements have to be made.

The reports impending are the report on the Herbst hollow reinforced-concrete floor, and the Eggert reinforced-concrete floor, which were tested in January.

HOMAN'S FIRE-RESISTING FLOORS

Have been executed in over 3,000 Buildings, and are the most efficient and economical.

Constructional Steelwork of all kinds:—
CAST IRON COLUMNS,
CONCRETE STAIRCASES,
GRANITE WORK,
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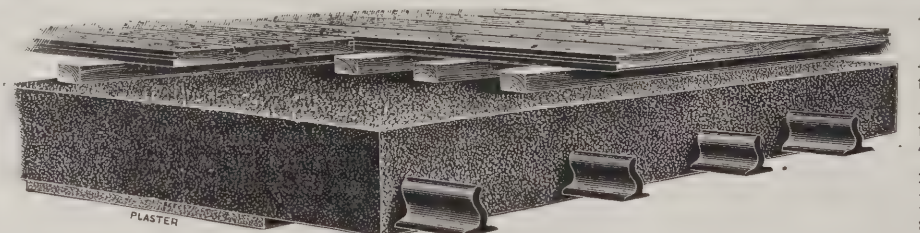
IRON ROOFS, etc.



Advantages of this Construction:—
All tensional stresses taken by the steel.
All compressional stresses taken by the concrete.
The waved web secures a firm hold on the concrete.
Is cheaper than any other system.

Homan's Patent Steel and Concrete Floor is the latest development of reinforced concrete.

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Telephone: 1026 Avenue.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
April 10, 1907.
FIRE SUPPLEMENT (MONTHLY).
Vol. XXV, No. 635. 6, Great New Street, Fetter Lane, London, E.C.

REINFORCED CONCRETE AND FIRE-RESISTANCE.

The Insurance Point of View.

Questions are frequently being asked how it is that reinforced concrete structures should not have any advantages in the matter of insurance rates, such structures, when properly built with suitable concrete aggregates and with the metal properly protected, being obviously safer insurance "risks" than any other form of building.

We would thus like to point out to architects that the mere provision of a reinforced-concrete structure does not affect the insurance question at all, and that if they wish to act in the interests of their clients it is necessary that the structure in every way should meet the insurance requirements, and thus be classed as "fire-resisting": it will then merit certain insurance favours which would not otherwise be received.

It is, of course, most regrettable, from the building owner's point of view, that, having erected a reinforced-concrete building, he should have to pay the same insurance rates as his neighbour who has buildings with unprotected steel joists, or, as it is generally called, old-fashioned "fireproof" construction. But the truth is that the fire-insurance companies would rather have steel joists unprotected, and know exactly where they are from the fire-insurance point of view, than have reinforced concrete in which the safeguards which they require have not been provided.

That the insurance companies are right in requiring certain safeguards is too obvious to merit discussion, for nothing could be more dangerous from the fire point of view than a reinforced-concrete structure where the necessary precautions have not been observed: in fact, it will shortly amount to this, that reinforced-concrete construction in which proper safeguards have not been observed will be rated higher than ordinary structures, and we believe this will be the only way in which the insurance companies will be able to protect themselves against unsafe work. If the building owner has to pay the same for a reinforced-concrete structure as an ordinary building he may grumble, but that is all, but should he have to pay a higher rate for a reinforced-concrete building, he will very soon see the reason why his structure should not be built to meet the insurance requirements, so as to merit the best available rebate.

As a matter of fact, insurance companies encourage good reinforced-concrete construction, and they were among the first to recognise its advantages from a fire point of view if properly executed. Architects will do well therefore to carefully study the insurance regulations which are here given. We have referred to them before in conjunction with other matters, but in this case we print them in full and treat them as a subject apart:—

Fire-Office Rules as to Reinforced-Concrete Construction.

Buildings constructed with concrete reinforced in every part with embedded metal rods or bars spaced not more than 12ins. apart, securely connected or overlapping at least 6ins. at all abutments and intersections, having also bands or bars across the thickness of the concrete, may be deemed of standard fire-resisting construction, provided they conform to the above rules, with the following modifications:—

Rule 3.—Concrete may be composed of sand and gravel that will pass through a ¾in. mesh, or of the other materials mentioned in the rule, but in any case the cement used must be Portland (equal to the British Standard Specification of December, 1904) in the proportion of 6cwts. of cement to each cubic yard of concrete. The concrete must be thoroughly mixed both wet and dry, and must be rammed round the metalwork in position, every part of which must be completely enclosed with solid concrete.

Rule 4.—No external wall to be less than 6ins. and no party wall less than 13ins. thick in any part.

Rule 7.—Flues may be built of reinforced concrete, as described, not less than 4ins. thick, if lined throughout with fire clay tubes not less than 1½ins. thick. No timber or woodwork to be in contact with such flue.

Rules 10 and 11.—Floors must be constructed of reinforced concrete, as described, not less than 5ins. thick in any part without woodwork bedded therein, supported on beams and columns of similar reinforced concrete.

Rule 13.—Roofs must be constructed in a similar manner to floors, the concrete in no part to be less than 3ins. thick.

Rules 14, 15, and 16.—All structural metalwork must be embedded in solid concrete so that no part of any rod or bar shall be nearer the face of the concrete than double its diameter, such thickness of concrete must be in no case less than 1in. but need not be more than 2ins

Rule 18.—Enclosure to staircase and hoist, if of reinforced concrete as described, may be 6ins. in thickness.

Rule 22.—Fireproof compartments in connection with reinforced-concrete structures must also be of reinforced concrete as described, with walls not less than 9ins. and floors not less than 5ins. in thickness.

It has of course been argued that the Fire-Office rules in this connection are a hardship, but the reverse is the fact, and, compared with the Fire-Office rules of the United States, the British requirements are mild indeed. In the States 3ins. and even 4ins. of protection is required around bars, and modern protection goes so far as to insist upon an additional coating of "cinder" concrete or porous terra-cotta as an encasement to the reinforced-concrete beams and columns, just as the steel beams and columns are encased in concrete.

Expert Opinion.

That the insurance rules are in accordance with the best opinions on fire protection and the fire service may be seen from the following two resolutions. The first was passed by the International Congress of Architects in London, and reads as follows:—

That where reinforced concrete is intended to be fire-resisting the greatest possible care must be taken as to the nature of the aggregate and its size, and also as to the protection of the steel.

A second resolution which was passed at the International Fire Congress at Milan indicates the safeguards in greater detail; it reads as follows:—

That the Congress considers that no reinforced-concrete construction should be permissible in buildings intended to be fire-resisting unless the aggregate be most carefully selected and applied in such a manner as to give substantial protection to all metal parts.

That it is advisable where reinforced concrete is intended to be fire-resisting that every portion of the metal rods or bars contained therein be covered by not less than 2ins. of concrete, the aggregate of which must be able to pass through a sieve having a mesh of no more than 1in. diameter, and that Portland cement of great fineness only be used.

That where feasible all external angles should be rounded.

That any angle iron needed for mechanical protection should be held in position independently of the concrete.

With regard to these resolutions, we think the requirements as expressed at the Milan Congress are those that will be best observed by architects, and will certainly meet insurance requirements.

Results of Independent Investigation.

Independent investigation has clearly shown that safeguards are very necessary in reinforced concrete from the fire point of view. The mere statement that the building is of reinforced concrete does not mean that it has any fire-resistance. Of "poor" reinforced concrete the most that can be said of its advantages is that the material used is incombustible, but incombustible materials do not constitute fire-resisting construction: in fact certain incombustible materials are a distinct source of danger, as, for instance, the steel bar and steel joist if not properly applied. It has often been remarked that it was unfortunate that these "dangerous" incombustible materials had in the London Building Act of the 'fifties been described as "fire-resisting" or even as "fireproof" materials, for it takes several generations to forget a description of this kind.

We would thus very much impress upon those who are entrusted with the designing of factories and warehouse buildings to bear in mind the safeguards necessary for reinforced-concrete construction, which, if promptly dealt with before the work is started, will mean a substantial economy to the building owner in insurance rates, and which, if not borne in mind, will probably mean an extra expense to the building owner in high rates.

Apart from the fire-resistance of reinforced concrete, we shall shortly be looking forward to studying the question of

the fire-resistance of concrete blocks

and concrete hollow blocks, which are rapidly gaining in popularity in the United States. In this connection we give below a short summary of an interesting address delivered by Mr. Edward T. Cairns, of New York, at the annual convention of the National Association of Cement Users. (Mr. Cairns, it should be noted, is chairman of the Committee on Fireproofing and Insurance, and a member of the National Fire Protection Association):—

The past year has witnessed some interesting progress in the development of fire-resistive qualities of concrete. In the hollow block line there have been no actual fires of importance in buildings of this construction, so far as your Committee have learned, but several tests have been conducted by various parties, all of which tend to confirm the views expressed in last year's report to the effect that concrete, properly made and applied, is an excellent fire-resistive material for certain uses, but has limitations which preclude its being properly classed as absolutely "fireproof." Tests such as have recently been reported in the Press by Mr. Somerville, of the Washington Building Department, and others, demonstrate beyond doubt that hollow block will surely break apart from unequal expansion of the different sides if subjected to a very serious fire, and therefore such blocks are not suitable for "fire walls" or for any part of a building which, by reason of its size or contents, may develop a fire of high temperature, or, particularly, of long duration.

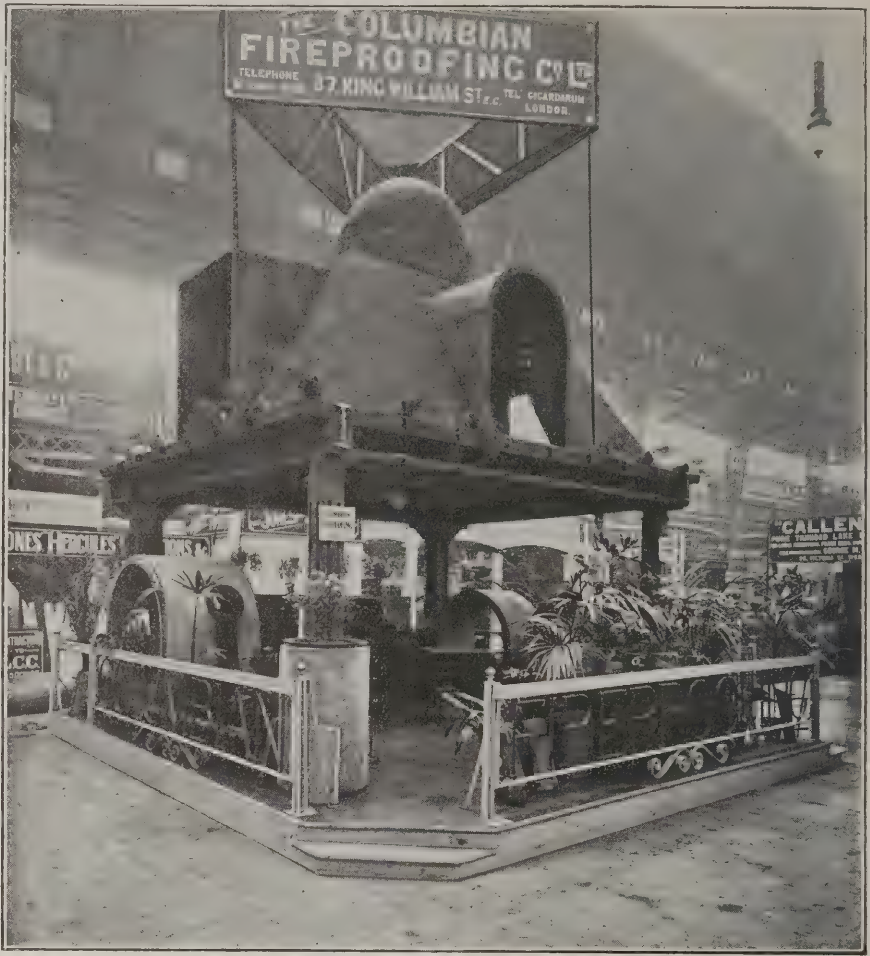
Other experiments, involving fire of shorter periods or lower temperature, have developed this weakness, and indicate that under conditions of comparatively mild exposure, hollow blocks may be reasonably safe. Just how much fire they will stand in point of temperature and time is yet to be determined, and, we anticipate, will be ascertained in the tests now in progress by the Government Laboratory, under Mr. Humphrey, and the Underwriters' Laboratory at Chicago. We shall be disappointed if considerable of this data is not produced during the current year.

FIRE-RESISTING CONSTRUCTION AT OLYMPIA.

Some of the leading exhibits at the Building Trades' Exhibition at Olympia are of much interest in relation to fire-resisting construction and the prevention of the spread of fire. It is appropriate therefore that they should be dealt with in this "Fire Supplement," leaving the other exhibits to be treated in the ordinary columns of this journal.

The exhibition is certainly a striking illustration of the enormous advance made in the uses of steel protected by concrete, of plain concrete work, and of reinforced concrete systems, and there can be no doubt that if these combinations of concrete and steel are properly designed and carefully carried out, the fire loss of the country must be reduced to no small extent. As to the systems of construction and materials shown, many have withstood the test of independent investigation, and the increasing popularity of the stands where these systems and materials are exhibited affords striking evidence of the advantage of the specialists taking the architects and engineers more fully into their confidence, and showing what their work will really do, what it is best suited for, and for what it is not suited. The new-comers in whose exhibits brick is used in conjunction with steel and concrete should be welcomed.

Many accessories exhibited also claim attention from the fire point of view, more particularly everything relating to the protection of vertical window and door openings, while, as allied to work directly connected with fire-resisting construction, we cannot omit reference to the roofing materials for flat roofs which are claiming attention at the moment owing to the new amendments to the London Building Act.



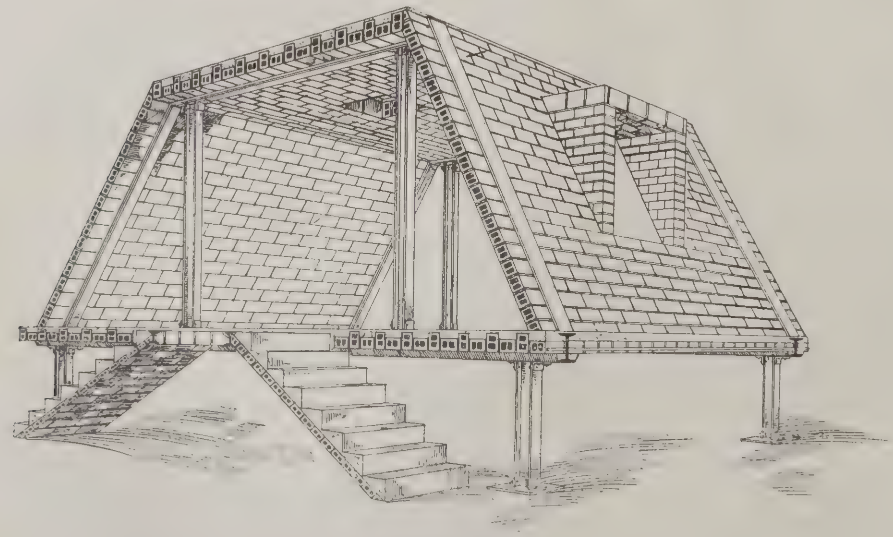
THE COLUMBIAN FIREPROOFING CO.'S STAND.

Columbian Floors, &c.

The Columbian Fireproofing Co., Ltd., occupy special position No. 9 with a stand constructed throughout to illustrate their system of reinforced concrete. It is built up in the form of a mansard roof with a dormer on each face, and crowned by a semi-circular dome, the whole being supported by a column at each corner. One side of the stand illustrates the single form of construction, and the other side the Columbian double form with an air space between. In both cases the Columbian double cruciform bar is employed between the main girders, while exhibited on the stand are some of the bars themselves, together with the stirrups into which they are fitted for connecting with the girders. The Columbian system has been extensively employed in this country and abroad, and among recent applications of it may be mentioned the "Morning Post," where, beside the floors throughout the building, the mansard roofs and the dome at the Strand corner are carried out on this system. Readers will recollect that in our last "Concrete and Steel Supplement" we gave some illustrations showing the construction of this interesting dome. Exhibited at the stand also are some specimens of the Bonna reinforced pipes. The advantages of being able to form pipes on the job have long been recognised, as it is only necessary to cart the metal and cement to the site, and then to mould the pipes complete on the job. This form of reinforced concrete pipe is used for sewage and water, and will be especially of interest to municipal engineers. There is also exhibited at the stand a portion of a retaining wall as used for reservoirs, &c., this wall having Columbian bars embedded in it.

Kleine Floors and Roofs.

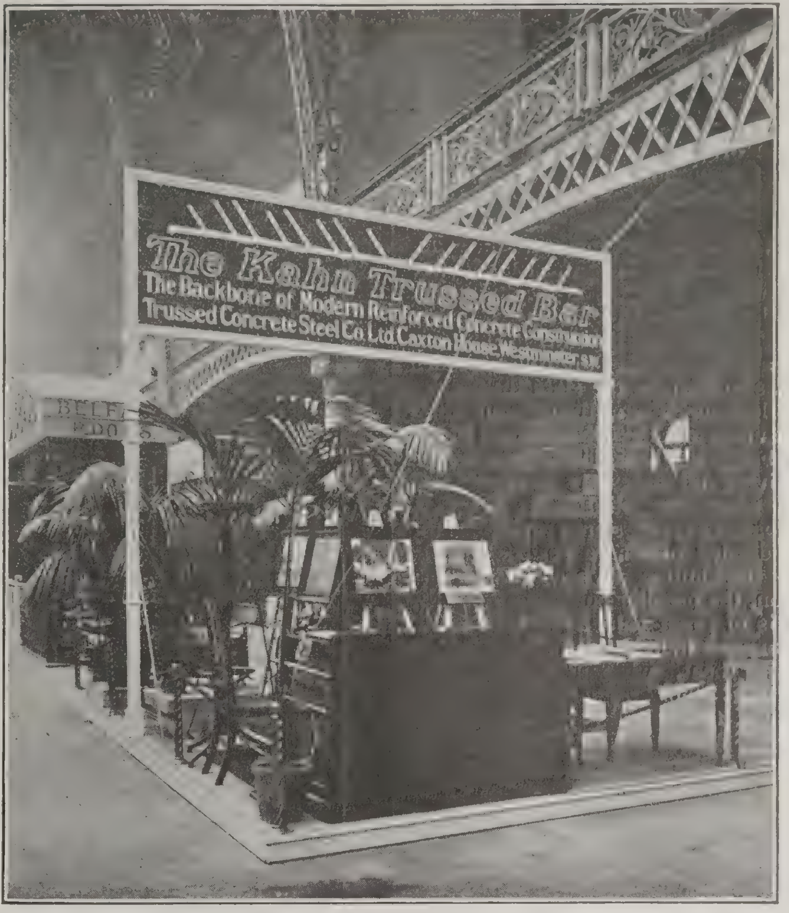
The Kleine Fire-Resisting Flooring Syndicate, Ltd., occupy stand No. 82, row D, which is constructed in the form of a single floor with a mansard roof, and flat over. The stand has a steel frame of rolled steel joists and stanchions, in conjunction with which terra-cotta bricks are used. These bricks measure 10ins. by 4½ins. by 6ins., and have two cavities running through them with a ¾in. web between, thus reducing weight. The floor of the stand consists of these bricks covered over with ballast concrete, and a hoop iron tension band through each joint. The total thickness is thus 7ins. The top portion of the stand is formed in a similar manner, and the sloping sides with bricks laid flat throughout. We are informed that the Kleine system is making considerable advance in this country.



THE STAND OF THE KLEINE FIRE-RESISTING FLOORING SYNDICATE, LTD.

The Kahn Trussed Bar.

The Kahn Trussed Bar is shown at special position No. 13 by the Trussed Concrete Steel Co., Ltd., of Westminster. There is no specially designed stand to show this form of reinforced concrete construction, but some of the bars themselves, both separate and embedded in sections of concrete flooring, are shown. The Kahn bar is distinctly different to other bars used for reinforcing concrete in respect to the shear members, which usually consist of hangers. Separate hangers are in this case rigidly attached to the tension member and punched out of it. This renders the bar extremely economical in practice, while it has the theoretical advantage in the fact that the shear members are rigidly attached, and so do not slide along the bar. Furthermore, it is obviously superior from a fire-resisting point of view, as it is caused to perform its work without dependence upon the quality of adhesion which a fire would destroy.


The Kahn Trussed Bar
The Backbone of Modern Reinforced Concrete Construction
Trussed Concrete Steel Co Ltd Caxton House Westminster S.W.

THE TRUSSED CONCRETE STEEL CO.'S EXHIBIT.

Frazzi Construction and "Marblite."

Stand No. 48, row B, is occupied by Messrs. A. W. Green & Co. The stand has a steel frame, and is enclosed by Frazzi hollow terra-cotta partition and floor blocks, forming walls and roof, a portion of the roof being left exposed so as to show the floor slabs in conjunction with the joist covers, while the centre of the span illustrates the manner of using the arched slab. On the under side the slabs are plastered with $\frac{3}{16}$in. thickness of a new plaster called "Marblite." The particular quality of this plaster is that it is a pure gypsum plaster, and can be painted, papered, or distempered within one and a half hours of its setting. It has a marble-like surface. A feature of this plaster also is that it can be used for external work as well as for inside work. This is shown at the stand, the end of which is peeble-dashed and roughcast. The firm claim that this plaster is 25 per cent. cheaper than ordinary special plasters on the market. At this stand besides the Frazzi blocks, which have four cavities running throughout, leaving intervening webs of about $\frac{3}{8}$in. thickness, there is shown the porous terra-cotta slab of Mr. A. E. Brown, which also has four cavities running through it. It is possible to drive nails into these slabs for fixing woodwork. The plastering at this stand has been carried out by Messrs. R. Murray & Son, of Chiswick.

In the gallery, stand No. 3B, row B, Messrs. A. Gray & Co., of 59, New Bond Street, W., show Frazzi fire-resisting construction in the form of armoured wire netting, which consists of a wire mesh covered with terra-cotta paste, and the whole plastered on either side.

FIRE SOUND
MACK
VERMIN PROOF
PARTITIONS, CEILINGS, PUGGING &c.
J. A. KING & CO. 181, QUEEN VICTORIA ST.
EXPANDED METAL
MACK
FIREPROO
CEILINGS
IDECA.

THE NEW EXPANDED METAL CO.'S STAND

Expanded Metal.

The New Expanded Metal Co., Ltd., have an attractive stand at special position No. 4. The arched roof, walls and ceiling are completely formed with expanded metal plastered on both sides, with sections left exposed so as to clearly show the form of construction. The floor also is formed with expanded metal of heavier quality covered with 5ins. of concrete. This form of construction is very easy and economical to carry out, and adapted to various shapes of rooms, awkward angles, &c. It is a very good form of fire-resisting construction, and has been employed very extensively for all classes of building, both in this country and abroad. For fire-resisting floors the use of the larger mesh of metal is very popular. The steps leading up to this stand are formed of concrete with expanded metal embedded therein, while another feature at the stand is a model of a retaining wall of concrete and expanded metal. There is also shown a section of a sewer or water conduit having expanded metal reinforcement.

MESSRS. ARTHUR L. GIBSON & CO.'S EXHIBIT.

Steel Rolling Shutters.

An interesting exhibit is that of Messrs. A. L. Gibson & Co. (19-21, Tower Street, W.C.), whose stand in the annexe—No. 214, row O—is fitted with two types of Kinnear patent steel rolling shutters. The protection of window and door openings is a most important matter as a means of preventing the spread of fire, and these shutters have proved of great merit in this way, especially in the great San Francisco conflagration. The most distinctive feature of these shutters is the formation of the slat. Instead of being separate strips of steel fastened together at intervals by ordinary hinges, they are rolled of such section as to form in the slats themselves an interlocking hinge throughout their length, sufficiently flexible to permit of the shutter being easily coiled on the roller, while giving all necessary strength and rigidity when the shutter is lowered. Counterbalance springs are provided in the roller, adjusted to secure perfect ease in working the shutter. When used for fire protection, the peculiar construction of the shutter is of great value, the slats being free to expand individually when exposed to intense heat, without buckling the shutter as a whole. The shutter passed successfully through the official tests of the British Fire Prevention Committee, and obtained the highest possible classification as "fully protective." Two of the shutters shown are precisely as they were left as the result of the testing operations.

"Mack" Partitions.

Messrs. J. A. King & Co.'s stand (No. 88, row D) is built up of "Mack" slabs showing the application of these for partitions, ceilings, floors and roofs, and for pugging, a speciality also being made of 5-in. "Mack" pugging blocks laid on fire-resisting bearers between the joists, these having a particular relation to the fireproofing of projecting shop roofs. The exhibit shows fire-resisting floors in conjunction with both wood and steel construction, and a special feature has been made of suspended ceilings formed with "Mack" slabs, these providing air-ducts for heating or ventilating, &c.

Indented Bars.

The Patent Indented Steel Bar Co., Ltd., at stand No. 228, row Q, annexe, show specimens of their indented bars for reinforced concrete of the various standard sections, as well as views of structures erected with these bars. The indented bar gives a mechanical bond, while its section is unform—that is to say, there is no waste metal in the bar. It is rolled from high elastic limit steel, which gives a greater factor of safety than mild steel, as many tests have shown that reinforced concrete beams generally fail at the elastic limit of the steel. The bars have been used in many important structures in the United States, and since their introduction twelve months ago have come into general favour here.

Stonwod Flooring.

At stand No. 36, row A, the Stonwod Fireproof Flooring Co., Ltd., of 109, Victoria Street, S.W., show some specimens of flooring and returned angle and dado work carried out with a jointless flooring composition. This is laid *in situ* to any desired pattern, and presents a perfectly jointless surface. It is thus a thoroughly sanitary flooring, and it has the additional merit of being fire-resisting. In cost it does not work out much higher than linoleum (which it somewhat resembles in appearance), but, whereas linoleum is a floor *covering* only, this constitutes both the floor and the covering, and so is cheaper in the end. Some steps are shown at the stand to illustrate how the tread, nosing and riser can all be formed together, without joint of any kind, thus being extremely sanitary. The material, after being laid, hardens in a few hours, and is then scraped and oiled. For floors that have to withstand the vibration of heavy machinery, or floors that have to bear heavy weights, a form of this material reinforced with wire netting is employed.

Concrete Partitions.

The Acton Concrete Partition Co., of 63, Cornhill, E.C., have a stand (No. 106, row F) built with partition blocks composed of Portland cement and breeze, which are claimed to be thoroughly fire-resisting. These blocks or slabs measure 16ins. by 10ins., and are made in three thicknesses—namely, 2ins., 3ins., and 4ins. The 2-in. size is that most frequently used, as being more easy to handle and more quickly fixed. The slabs are laid with ordinary cement mortar, and have a groove all round, so that a complete tongue is formed in the joint. This form of joint, together with the lock at every second course, gives the partition great solidity and rigidity. The slabs have a rough surface that forms a good key for plastering, tiling, mosaic work, etc., and no plugging is necessary, as all woodwork can be fixed by nails driven direct into the slabs.

Hempstead Partitions.

At stand No. 64, row C, is shown the Hempstead fire-resisting partition. This is built up with semi-porous terra-cotta blocks of 3-in. thickness, plastered on one side, and with three cavities running through them. The clay with which these blocks are formed is of a very fire-resisting character, and the makers state that the partition is a good one. A strength test on a 2½-in. partition was carried to 240lbs. load per foot super. The stand is divided into two by a partition, and fitted into this is a fire-resisting door having a metal frame, and filled with Hempstead terra-cotta blocks, finished on each side with granite plaster to a smooth surface.

"Hercules" Partitions, and Slag Wool.

Messrs. Frederick Jones & Co. have a stand formed with "Hercules" partition slabs. These are fire-resisting, and are made in thicknesses of from 2ins. to 4ins., and varying in length from 3ft. up to 7ft., so as to be adaptable to all classes of work. There are two varieties of these partitions, one having the face perfectly smooth, which requires no finishing coat whatever, and the other with a keyed face on both sides for finishing off in any materials that may be required as a setting coat. The ceiling of the stand is reinforced with wire-netting to ½in. thickness. Slag wool is also shown at this stand, the advantages of which material for sound deadening, insulating, etc., are well known. Messrs. Fredk. Jones & Co. are amongst the largest manufacturers of slag wool.

A Fire-Escape Ladder.

At the stand of the Granite Silicon Plaster Co., Ltd., of 36, King's Road, St. Pancras, N.W. (No. 50, row B), in addition to the exhibit of granite silicon plaster —which is used both as a plaster in the ordinary way, and formed into 2-in. solid partitions—there is shown the "Presto" ladder. This has been devised to comply with section 12 of the London Building Acts (Amendment) Act, 1905, and is made in two varieties, wood and stamped steel; in each case, however, the main principle is the same, being that of a ladder working in conjunction with a trap door or skylight, and so arranged as to be folded neatly out of the way when not required. The wooden ladder folds in two lengths, which hang close beneath the ceiling. The steel ladder is built up with toggle sides, so that, while normally occupying a small space beneath the trap, can be pulled out to full length with great ease and rapidity; the pulling down of the ladder opening the trap at the same time. When pushed up out of the way the trap is also locked automatically, and cannot be opened from the outside. As a means of escape from fire therefore this ladder is especially serviceable.

D. G. Somerville & Co.

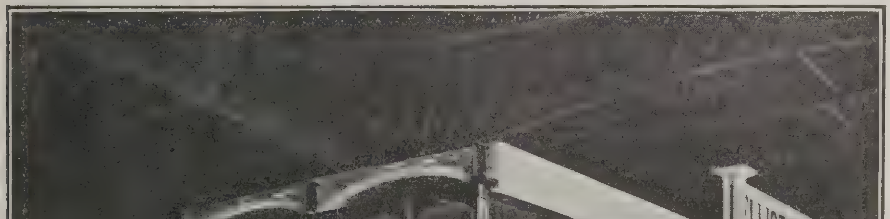
This firm, of 72, Victoria Street, S.W., occupy special position No. 24, their stand being a reduced replica of the upper portion of a steel-framed building with reinforced concrete floors and roof erected by them at Market Street, Paddington, for the National Telephone Co. Sections of the firm's systems of fire-resisting floors are shown, one being essentially a reinforced concrete system, and the other combining steel joists with reinforced concrete tiles. Photographs of work executed are also exhibited at the stand, as well as some sections of a patent reinforced concrete pile used by Messrs. Somerville in the reconstruction of the Town Quay, Southampton.

Kulm Partitions.

At bay No. 19 Mesesrs. Horace W. Cullum & Co., of Craven House, Kingsway, show their patent "Kulm" fire-resisting partition and ceiling slabs. These vary in thickness from 2ins. to 4ins., and are made in a standard size of 3ft. 6ins. by 11ins. deep, and can be cut for breaking bond. They are formed of pumice-stone concrete, which affords a good key for plaster or fixing tiles. The pumice-stone is naturally highly fire-resisting. The end of the stand shows some glass tiles fixed on the face, while the corners are shown finished with a patent plaster, ⅛in. thickness. These slabs have been tested by the British Fire Prevention Committee with very satisfactory results.

Vulcanite.

Messrs. Vulcanite, Ltd., of 118, Cannon Street, E.C., show at their stand (No. 94, row E) a model illustrating how their patent roofing is laid, while by an iron spiral staircase access is given to the roof of the stand itself, which is formed as a tank, filled with water, to show exactly how Vulcanite can be used for such purpose. The firm issue some suggestions for converting old thrust-out shop roofs to meet the requirements of the London Building Act Amendment Act, and visitors interested in this matter should get a copy of the leaflet giving these suggestions, as they are of much interest. Roofs of thrust-out shops must now be formed of 5-in. fire-resisting material. For such purposes a concrete will generally be necessary, and it is just for providing a thoroughly waterproof covering to the concrete that "Vulcanite" is adaptable, as it is not in any way liable to crack, is very elastic, and is guaranteed as being absolutely sound for long periods.



MESSRS. D. G. SOMERVILLE & CO.'S STAND.

Johnson's Wire Lattice.

At stand No. 83, row D, Messrs. Richard Johnson, Clapham & Morris, Ltd., of Manchester and London, have a construction illustrating their form of reinforcement for concrete. The chief feature in this form of construction is the Johnson Wire Lattice. The roof of the stand has a 12ft. span, and is partly formed complete and partly exposed so as to show the wire lattice. On the stand is a small office, the walls of which are also formed with lattice of smaller mesh covered with plaster, which brings the total thickness up to 2ins. The bottom floor of the stand is brought up to a thickness of 5½ins., and the top floor or roof of the stand to a thickness of 6½ins., these being about the average for floors of ordinary sized rooms. Numerous articles made up with Johnson's lattice are also exhibited at the stand.

The Fawcett Floor.

Messrs. Mark Fawcett & Co., of 50, Queen Anne's Gate, Westminster, S.W., are showing their fire-resisting floor at stands Nos. 191 and 192, row M, annexe. This floor, which was invented many years ago, is still a great favourite with many members of the profession. At this stand the construction of the floor is shown, with girders having hollow terra-cotta tubes placed in position between, ready for the concrete to be deposited. These tubes form a permanent centering to the floor, while they leave a hollow air-space that is a sound-deadener and a protection against fire. The special section of joist used is to be noted: the top flange is smaller than the bottom, as the concrete is estimated to take a certain amount of the compressive stresses.

"Terrawode" Brickwood.

This patent material is exhibited at stand No. 113, row F, by Messrs. Jabez Thompson & Sons, Ltd., of Northwich. It is obtainable in the form of bricks, slabs and hollow blocks, and is especially useful for the protection of iron columns, stanchions, etc. Circular blocks can be supplied as well as square slabs. Recent fires have proved how imperative it is, where steelwork is used, to protect the metal from the risk of fire. That "Terrawode" is efficient in this respect may be gauged from the fact that when tested by the British Fire Prevention Committee in 1905 for 2½ hours at a temperature approximating 2,000 degs. Fahr., the steel stanchions encased by it remained in position, and at the conclusion of the test were found to be quite unaffected.

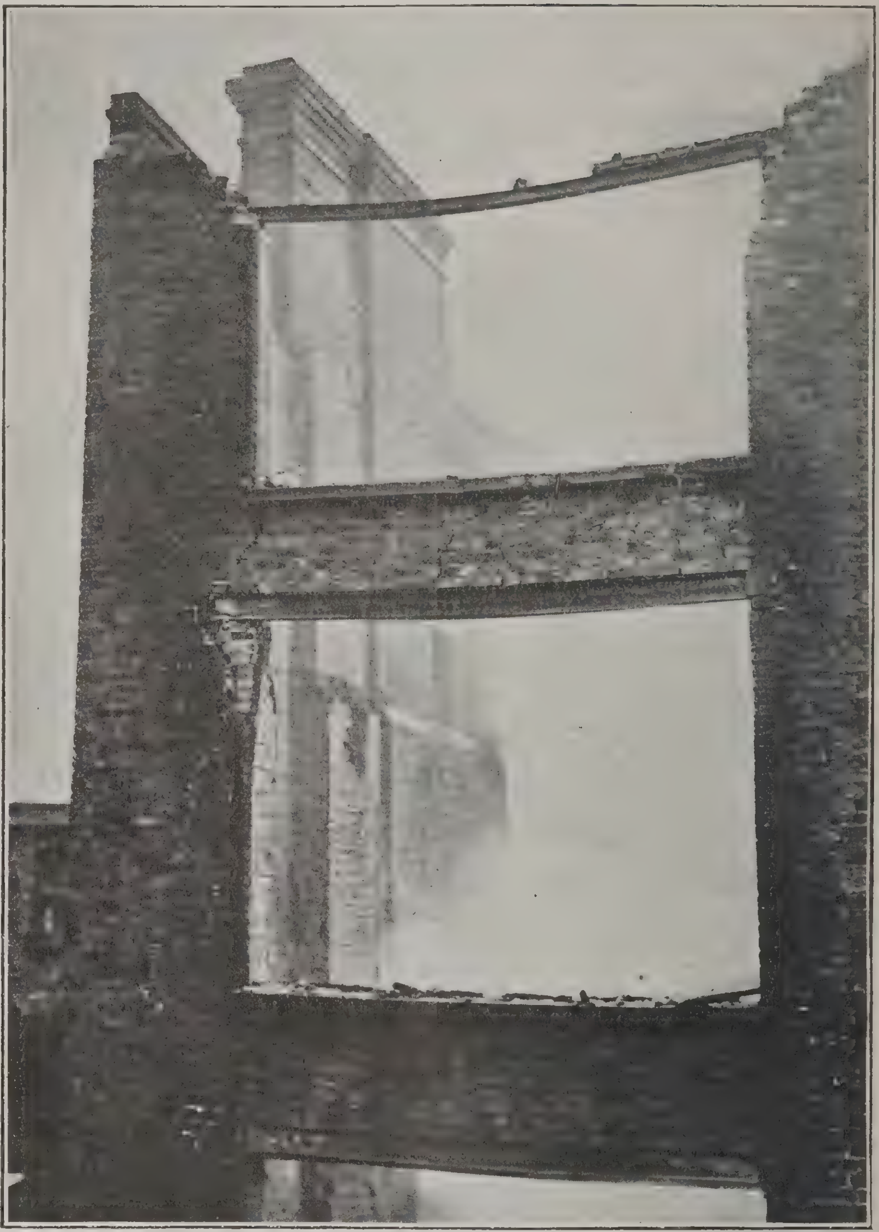
A Bucket Fire Extinguisher.

The patent bucket fire-extinguisher of Messrs. Messer and Thorpe has now been before the public so many years, and has been so extensively employed for all kinds of buildings, that the exhibit at stand No. 139, row H, will be familiar to most visitors. The device consists of a tank filled with water, in which a nest of buckets drop one inside the other between grooves. The tank holds sufficient water to fill up the buckets, with an ample allowance over, and is a most admirable arrangement, occupying very little space, and being always ready for use.

The new Peebles Hydropathic has been completed on the site of the old building, which was destroyed by fire. The cost of the new building has been about £70,000, including furnishing, &c. There are about 200 bedrooms. Mr. James Miller, A.R.S.A., of Glasgow, was the architect.

THE CITY ROAD FIRE.

The fire which occurred on March 13th in City Road, E.C., was one of the worst that the Metropolitan Fire Brigade have had to contend with for a considerable time, and it is again an object lesson of the extremely unsatisfactory construction to be found in many of our large warehouses. It would be mere repetition to enumerate all the faulty construction discoverable in the premises affected. Nevertheless, we must point to the fire as an example, and we illustrate a piece of brickwork as particularly indicating how rash it is for architects to put unprotected steel lintels over window openings. Such lintels are not only of no advantage, but they are a distinct menace, for they affect the brickwork in a most serious manner, and no brickwork, not even the best London-made brickwork, can stand the strains of such unprotected lintels. The brickwork in this particular case was good, but it was ruined by unprotected steel.



THE CITY ROAD FIRE.

COLUMN AND WINDOW PROTECTION.

The Lessons of a Great Fire.

At the meeting of the Society of Architects on March 14th a very fine collection of photographs of the San Francisco conflagration was shown through the lantern by Mr. Ellis Marsland, who gave a short summary of the points of interest as each slide was presented. The views were arranged in three groups illustrating :—

(1) Buildings with brick or stone walls, carrying floors of fire-resisting construction;
(2) Steel-frame buildings with reinforced concrete floors and fire-resisting partitions; and
(3) Buildings with hollow tile floors and partitions.

One of the facts most strikingly illustrated by the lantern slides, to our mind, was the neglect to provide columns with suitable protection. In many cases the floors would have stood splendidly had it not been for column collapse, and in many other cases, despite the sagging of columns, the floors actually stood.

Another point that the photographs illustrated in a most remarkable manner was the advantage of the vertical support that is circular on plan, as against the vertical support that is rectangular on plan. There were also some remarkable illustrations of the advantages of fire-resisting glazing.

We have of course dealt several times with the San Francisco conflagration, but we think it of interest to give Mr. Marsland's summary of the lessons of this fire to architects.

" Of the general run of the buildings little is to be learned : they burnt, collapsed, and there was an end of them, and so complete was their destruction that every scrap of combustible material was entirely consumed and blown away as ash, leaving scarcely a trace behind.

" Judging by the number of steel-frame buildings which have survived, so far as their shells are concerned, I think it is demonstrated that the steel skeleton frame is satisfactory, provided its individual members are sufficiently protected.

" The glaring omission to protect the exterior openings was the direct and sole cause of the damage and destruction of the interiors in most cases. This is further emphasised by the fact that other buildings, of much less pretensions to be fire-resisting, have remained undamaged by reason of their window openings having some such protection as wired glass, steel shutters, or other form of fire-resistant properly applied.

" I would, therefore, sum up my observations by inculcating the following lessons :—

I. *Protect the openings against fire from the outside.*

This, to my mind, is the most important lesson, and is the key to the position. The flames were communicated to the so-called fire-resisting buildings from the outside through the windows and doors. There are now available practical devices to safeguard such openings which may be adapted to the varied circumstances of each case.

II. *Adequate protection to columns and other structural members.*

You will have noted how utterly, in some cases, the column protection failed, and in others how it succeeded in keeping the ironwork sufficiently under a certain temperature to prevent buckling : both hollow tile and metal lath and plaster protection seemed to have been wanting when any long sustained heat had to be endured. I am inclined to the opinion that concrete filled in solidly all round the column right up to the web is the best protection, but whatever it is it must be securely anchored to the column, and there must be no voids, and if brick or tile is used it must be backed up with good concrete or cement mortar filling up entirely the space, and no pipes must be hidden in the protection, as their expansion may endanger the casing, which in its turn will imperil the safety of the building.

III. *Avoid as much as possible the use of refractory materials for façades.*

It will have been seen that granite, marble, sandstone, limestone and similar building stones proved unsatisfactory materials for architectural effects. This, however, will be no argument against their use, for being deprived of the use of these materials what is an architect to do?

Yet, knowing their inadequate fire resistance and the better fire resistance of all clay products, it behoves him to bear the fact in mind and avoid stone where damage might ensue by its employment for columns and piers carrying important points of support.

IV. *Select a good type of floor construction.*

It will have been seen that the hollow-tile floor construction failed in many cases by the expansion of the soffit causing it to split off and expose the cellular spaces. By a better construction of the tile this may be avoided in future. The examples shown, however, have been more favourable to reinforced concrete, and if this is executed in some form of "cinder" concrete or broken brick, and the reinforcement well protected on the soffit by at least 2ins. of material, I am inclined to pin my faith to that.

V. *Adopt partitions that do not expand.*

The hollow-tile partitions in the cases before us have not shown up very favourably. The reason is that when heated a large amount of expansion takes place, and bulging and eventual collapse is the consequence.

The metal lath and plaster partitions were also failures, and we are led to fall back upon some form of reinforced concrete or concrete slabs the thickness varying in accordance with their height. I am inclined to see in this material more satisfactory results.

THE BIRMINGHAM FACTORY FIRE.

On this page we give an illustration of the disastrous fire which occurred at Messrs. Coleman & Oldland's warehouse in Birmingham last month. We particularly present this illustration in conjunction with the one of the City Road fire to show how brickwork will stand up against the severest of fires if not affected by the strains of unprotected steel. The lintels here were by no means so well constructed as they should be for a factory, but for all that there was no unprotected metal, and the brickwork piers scarcely showed a flaw. One of the best forms of lintel would be steel embedded in concrete, so that the concrete protected the metal by at least 2ins., but preferably 3ins. If this lesson could only be learnt, much valuable property might be saved. We are enabled to give the accompanying illustration through the courtesy of "Men's Wear."

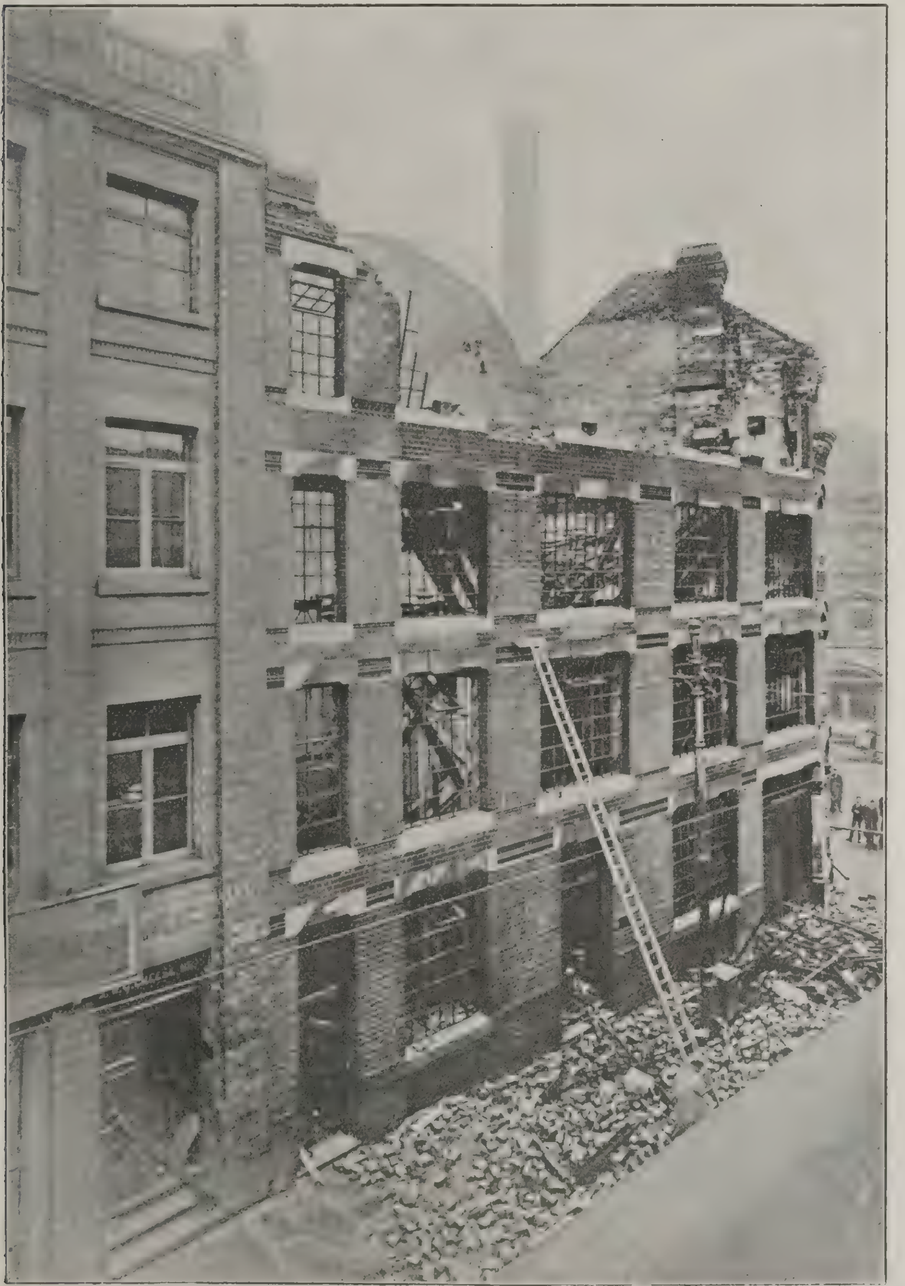


Photo: Forward Press, Birmingham

FIRE AT MESSRS. COLEMAN AND OLDLAND'S FACTORY, BIRMINGHAM.

THE NEW LONDON BUILDING REGULATIONS AS TO FIRE.

By Horace Cubitt, A.R.I.B.A., P.A.S.I.

In provincial towns complaints as to the trouble involved in the preparation and submission of plans for the approval of the local authority and as to the hardship of being compelled to conform to a code of by-laws are, we all know, by no means infrequent. The provincial architect, surveyor, or sanitary engineer has, however, only one authority to deal with, and only one set of regulations to consider, and there thus appears to be little reason to doubt that he has a much less arduous task in this particular respect than his professional brother in the Metropolis.

Fire Prevention.

When the regulations for the prevention of the spread of fire are referred to, it means that a very large portion of Part VI. of the London Building Act, 1894, which relates to the construction of buildings, has to be considered.

The details of these provisions are so numerous that a brief statement of the most important, and a summary of the remainder, is all that it will be desirable to attempt. The proper construction of party walls and the carrying-up of such walls above the roof are, of course, about

the most important of the fire-preventive regulations.

In the closely-built districts of London this appears to be an essential requirement, although in provincial towns of small populations the carrying-up of the party walls to the underside of the slates may be considered sufficient in the case of most buildings.

Another very important and closely-allied requirement, which, however, is not contained in the Model By-laws, and which appears to a very slight extent in American regulations, is that of limiting the

cubical extent

of buildings. In London buildings of the warehouse class are not allowed to be more than 250,000 cub. ft. without being subdivided by brick walls. In special cases the County Council may under certain circumstances consent to this limit being exceeded up to an extreme limit of 450,000 cub. ft. Buildings used partly for purposes of trade or manufacture and partly as dwelling-houses, if they exceed a given horizontal area, are required to have the dwelling-house portion and its approaches separated vertically by brick walls, and horizontally by fire-resisting floors from the remaining portion.

Other regulations

refer to the placing of timber in external and party walls, the construction and maximum slope of roofs, of chimneys and flues (both of ordinary and of special character), of floors above furnaces and ovens, the fire-resisting construction of staircases and floors in certain buildings, and the construction of projections, which, with certain exceptions as regards shop fronts, barge-boards, and cornices, &c., are required to be of fireproof materials. Half-timber work is only allowable by the special consent of the County Council.

Fire Escape.

The question of the provision of means of escape in case of fire was till recently restricted to a few sections of the London Building Act, 1894, to the requirements of the Factory and Workshop Act, 1901, and to by-laws made for the protection from fire of theatres and places of public resort under the Metropolis Management and Building Acts Amendment Act, 1878, all of these being administered by the County Council. This state of affairs has, however, been somewhat changed by the passing of the London Building Acts Amendment Act, 1905, which is entirely devoted to the question of fire escape.

The broad outlines of this Act can be stated without much difficulty, particularly as all the provisions are now in force, although the most important one in relation to existing buildings did not come into operation till January 1st of this year.

What the Act Requires.

The Act requires that means of escape in case of fire shall be provided from all new and existing buildings, except dwelling-houses occupied as such by not more than one family, which are occupied or constructed to be occupied by more than 20 persons, and from the floors of any building which are more than 50ft. above the level of the adjoining pavement. The Act applies to the whole county, including the City.

The means of escape which can be demanded are such as can be reasonably required under the circumstances of the case—similar wording to that of the Factory and Workshop Act, 1901, the escape provisions of which Act, together with those of the new Act, are administered by the County Council.

It is the duty of the district surveyors, when called upon by the Council, to notify to it all existing buildings in their district to which the Act applies, and the Council can then consider the question of serving notices on the owners, stating the means of escape required to be provided. The owner has, however, the option of submitting alternative proposals.

Protection of Roofs.

Other important requirements of the Act are those for the compulsory fireproofing of the roof of every new and existing shop which may project more than 7ft. beyond the front of a building in which persons are employed or sleep; those requiring the provision of access to roofs in certain buildings, and those regulating the storing of and means of escape from rooms containing inflammable liquid. It is noteworthy, however, that in special cases, if application is made, the Council can exempt buildings from the operation of the clauses relating to projecting shops and access to roofs.

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*Extracted from a paper read before the Institute of Sanitary Engineers, on February , 1907.

THE WOOD STREET FIRE.

Dangers of Matchboarding and Electric-Light Wires.

An enquiry into the Wood Street fire was held recently in the City Coroner's Court by Dr. Frederick J. Waldo, in the course of which some remarks were made which it is worth while putting on record in this supplement. (Readers will recollect that this fire was described and illustrated in our issue for February 13th.)

The Coroner said that this outbreak was the biggest he had had to do with since the Barbican outbreak in May, 1902, and as it had affected the area known as the Cripplegate danger zone, an inquiry was advisable. No doubt the jury were well aware that these warehouses were stocked with Manchester goods, the principal occupiers being those engaged in that trade. It was a very serious matter for those concerned in that business, who had to have premises near the scene of operations, as these fires had caused rates to go up tremendously, and this would certainly not tend to diminish them. So far as could be ascertained, the fire originated in the room of Messrs. C. Farmer & Co., on the second floor, who were in the silk trade. The lessors of the whole of the buildings were the Commercial Fire Insurance Co., the building being insured for £19,000, and the contents for £28,320. In all 90 persons were employed in the building.

One of the witnesses at the enquiry, a warehouseman named Brown, said that when he left the premises about ten minutes past six on February 4th everything was in order. He turned off the tap of the radiator stoves, and saw that all the electric lights were out. A few years ago there was a short-circuit fire on the premises, but it did no damage. The engineer to the Post Office said that it was due to the live wire of an electric radiator stove, which was being installed in the next room, touching a telephone wire. The telephone electricity had blown the gas pipes.

The Coroner said there was no doubt these wires were a source of great danger at the present time. He had had recently a number of very suspicious cases reported to him of fires caused by electric wires causing short circuits. There was no doubt that everything possible was being done to minimise the danger, but that they did constitute a danger there was no reason to question, especially in view of the spread of the use of electricity.

Superintendent John Smith, of Carmelite Street Station, said the fire must have been very fierce, as the three warehouses were practically gutted and unroofed.

Superintendent Allison, chief of the London Salvage Corps, said the suppression of the fire could only be described as a wonderful piece of work on the part of the London Fire Brigade.

Lieutenant Sladen, R.N., divisional officer of the London Fire Brigade, stationed at Euston, said that from his investigations he found that no efforts had been made to minimise the danger from fire.

The Coroner: You mean by means of hydrants, chemical extinguishers, private fire brigades, or automatic alarms?

Witness: No, I don't quite mean that. You see, I found that the building was lined with matchboarding throughout—that is, of course, presuming that the rest of the building was constructed as that portion which remains, and of which I have had an examination.

The Coroner: There ought to have been more precautions taken, you think?

Witness: I do, indeed. The cubic area of the building—I mean No. 12—is, I find, 250,000 cub. ft., and in the Building Act of 1904 it is ordered that all buildings having an area of 250,000 cub. ft. or more shall have the most perfect fire prevention arrangements. This building was, however, erected long ago, and comes under the Building Act of 1885, and there it is laid down that perfect fire arrangements should be made if the area was over 210,000 cub. ft.

The Coroner: Then, it clearly should have been done

Witness: Most certainly.

A Juror: Do you find more fires now than formerly due to electric wires?

Witness: Yes; five years ago there were only 20 a year, whereas last year we had over 150.

A Juror: And the large increase in electric lighting is to what I presume you attribute the increased number of cases?

Witness: Yes; electricity is in use everywhere now.

The Coroner: Do you consider there is anything in the suggestion that the wires should be carried through metal tubes?

Witness: Yes, certainly. I recommend that the wires should be carried through metal tubes in future.

This closed the evidence.

The Verdict.

The jury returned a verdict to the effect that the fire occurred "by some means unknown," and that no blame attached to anybody for the occurrence. They added a rider that matchboarding seemed to be a great source of danger, and that in all new buildings that method of covering up party walls should be entirely abolished, and all electric wires carried in metal tubes. Commenting on this, "The Drapers' Record" observes: "Most people will, we fancy, be astonished to learn that faults of the description indicated existed in a Wood Street warehouse. In view of the insurance rates demanded it seems an extraordinary thing that owners and occupiers do not in every case combine to see to it that all possible precautions are adopted. As an expert witness pointed out at the inquest, if the wind had been in any other direction, several acres must have been devastated."

A luxurious residence is being completed in Park Lane for Sir Ernest Cassel. This is "Brook House," which has been enlarged and reconstructed at great expense.

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THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
May 8, 1907.
FIRE SUPPLEMENT (MONTHLY).
Vol. XXV. No. 639. 6, Great New Street, Fetter Lane, London, E.C.

FIRES IN THE METROPOLIS.

Their Lessons to Architects.

The report of the London Fire Brigade for 1906 has now been issued. As in the previous year, it has been prepared by the chief officer of the Brigade, and has a prefatory note by the Fire Brigade's Committee.

The movement for fire prevention, which is now about ten years old, combined with the great efficiency shown by the London Fire Brigade during the last two or three years, has resulted in a most extraordinary improvement in safety from fire in the Metropolis; so much so that serious fires have become quite the exception, and such serious fires as have recently occurred have been stopped with a rapidity which the citizens of London should be justly proud of. Once or twice during the past year there have been the makings of another Cripplegate conflagration in the Metropolis, but the rapid mobilisation of the Brigade, combined with good tactics, prevented disaster.

In this Supplement we have not very much to do with the Fire Brigade aspect of fire protection in London, but there are several lessons to be learnt from the 1906 report that directly affect constructional issues.

Defective Electric Circuits.

The increase of fires as due to defective electric circuits increased to 100 during the year, the record for 1905 being 70. Having regard to the large number of electrical fires that must be hidden under the description of "unknown causes," the increase of the recorded instances of such outbreaks is more serious than would appear at first sight. Probably one of the reasons for the increase is that certain supply companies or corporations have been increasing their voltage for house supplies, and no matter what care may be taken in inspecting fittings or wiring adapted for the higher voltage, there can be no doubt that this increased voltage in itself must be a serious cause of additional fire hazard, more especially when such voltage for lighting purposes is over 220 volts. Architects should do all in their power to oppose high-voltage lighting in domestic and business premises.

Position of Gas Brackets.

Another point that should be remembered by architects after reading the report is the unsuitability of placing gas brackets close to window openings, where there is a probability of these openings being fitted with curtains; the number of fires that occur through such curtains catching alight is enormous. Many of these fires are never reported to the Brigade, but curtains or window-blinds coming in contact with gas lights accounted for 102 fires among the recorded ones which the Brigade attended.

In the cheaper class of house we know it is a favourable position for gas brackets to be placed near the window, but the position of these brackets should be altered.

We have mentioned the gas bracket near the window as a source of danger, but swinging gas brackets are also a source of danger, and account for 23 fires.

Turning to the tables with a view of finding other causes of fire that might be reduced by the careful attention of architects and contractors, we find that defects in flues account for 139 fires, timber under flues for two fires, defects in adjoining flues for 35 fires, and there are also quite a number of fires owing to blocked-up flues, overheated flues, and the like. Badly designed and badly constructed flues are certainly to be avoided, and by no means sufficient attention has been accorded by architects and contractors to this source of danger.

Defective hearths accounted for 15 fires, and timber under hearths for 14 fires. Improperly-set stoves accounted for 67 fires, and various accidents to stoves caused many additional outbreaks.

Altogether, the number of fires through structural causes was quite considerable out of a total of 3,843 recorded fires, of which 414 only are classified as unknown.

Lives lost.

The number of lives lost by fire during 1906 was 104, but this figure is really somewhat meaningless, having regard to the nature of the fires at which lives were lost, which includes a large number of fires due to clothing catching alight upon people in front of fires, and accidents or injuries from lamps. The great majority of the lives lost occurred long before the Brigade had been, or could be, called.

There is an interesting appendix to the report in the form of maps showing the location of fire-stations and the location of fires, and it is remarkable to observe that the fires seem to have been thickest in the actual shopping region of the West End and in the workshop district of Whitechapel.

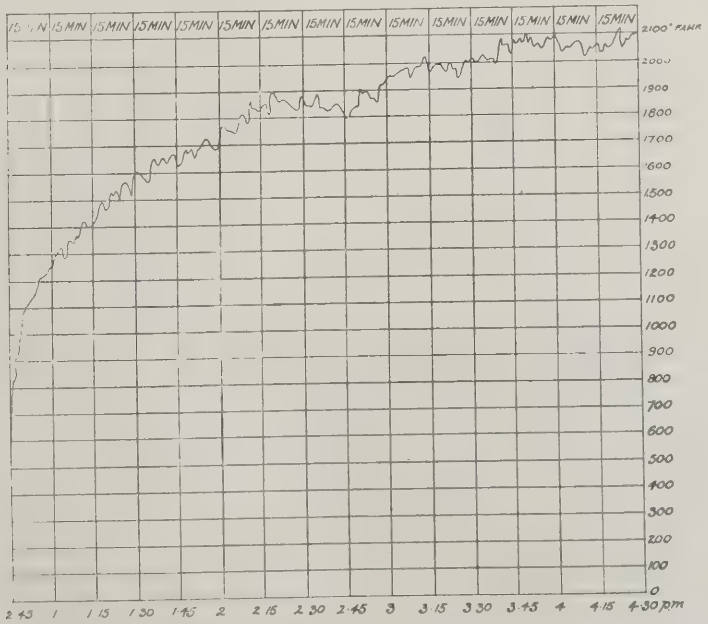
FIRE TEST WITH A REINFORCED CONCRETE FLOOR.

A floor of unusual interest tested recently by the British Fire Prevention Committee was what may be termed a hollow concrete floor, constructed on the Herbst system. In the preliminary note to the report just issued Mr. Ellis Marsland states that the floor was erected without the cost and inconvenience of centering, and he points out the lightness, strength and fire resistance of the floor, in which the iron reinforcement is well protected, and is in such a position as to offer the least possible surface to the action of the fire. Mr. Marsland emphasises the fact that, as in all reinforced concrete floors, great care is required in the manufacture.

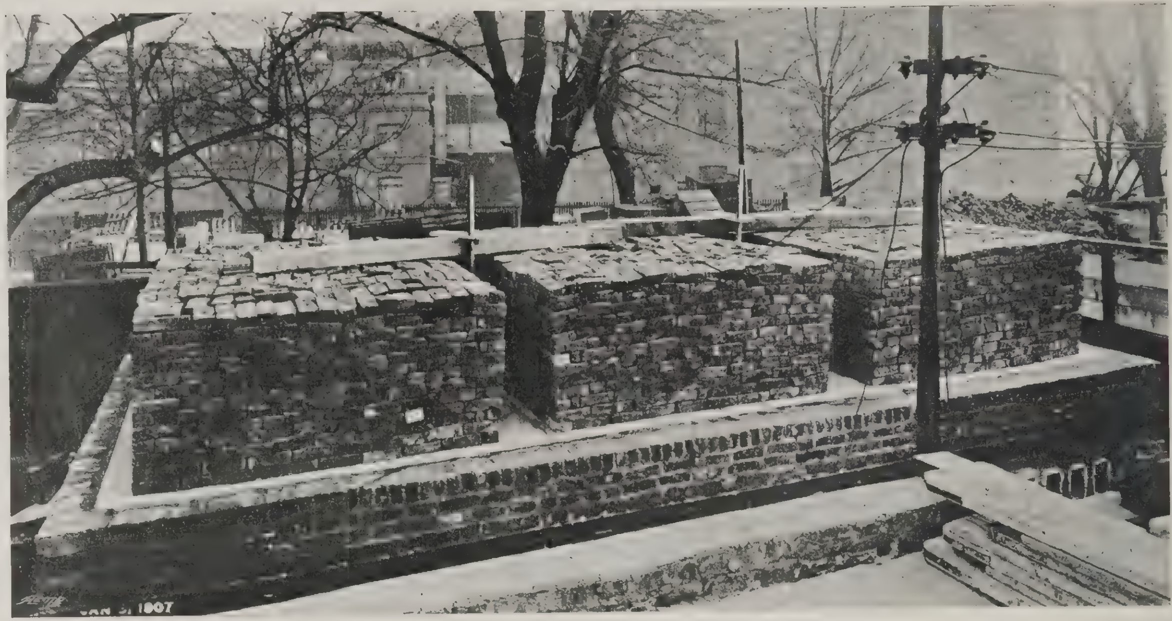
The floor is of such constructional interest that we reproduce from the committee's report a section showing it in detail. We also give a full description of how the floor was put together.

The construction

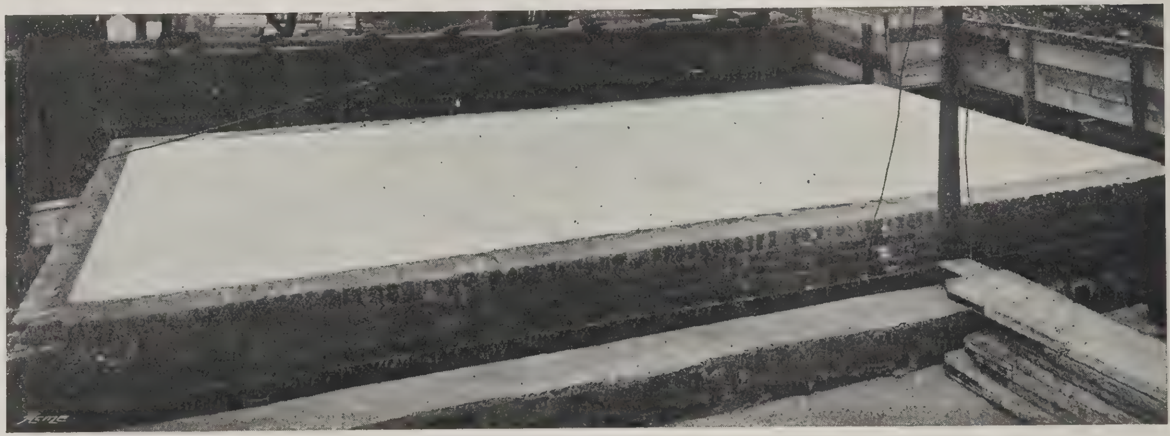
was as follows :—Transversely across the hut concrete webs were placed 11ins. (·2793m.) centre to centre. These webs were ⊥-shaped, 9½ins. (·2413m.) deep, 3ins. (·0762m.) wide on the soffit, and reduced to 1½ins. (·038m.) thick 2ins. (·0508m.) above the soffit, thereby forming a rebate. Embedded in the web about 1in. (·0254m.) above the soffit was a wrought-iron corrugated bar 1¾ins. by 5-16ths in. (·0444 by ·0079m.). Between these "webs" hollow concrete blocks were placed 9½ins. (·2413m.) deep, 8½ins. (·2159m.) wide, and 8ins. (·2032m.) long, with a rebate on each side which corresponded to the rebate on the web. The "webs" were made in timber moulds. The concrete was composed of 1 part of Portland cement (Hilton Anderson



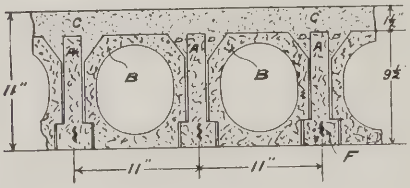
FIRE TEST WITH HERBST REINFORCED CONCRETE FLOOR: TEMPERATURE CHART.

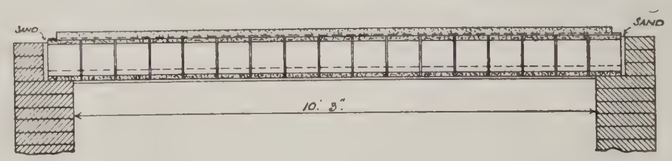


View of Floor from above, after Test, with Load in Position.

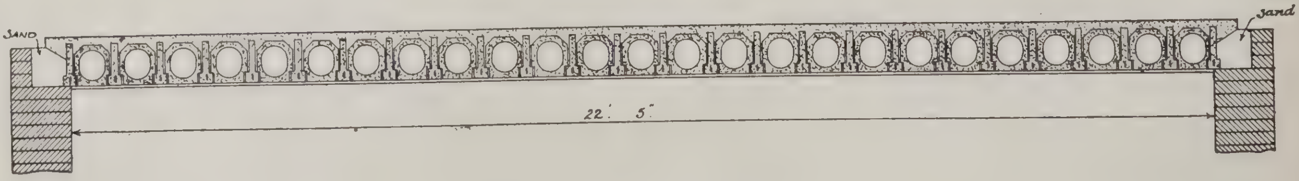


View of Floor from above, after Test, and after removal of Load.





CROSS SECTION



LONGITUDINAL SECTION

Details of Floor

FIRE TEST WITH HERBST REINFORCED CONCRETE FLOOR.

brand), 2 parts of shingle, passing ⅜ (·0095m.) mesh, and 1 part of sand. The tubes were made by means of a hand-press, and the concrete was composed of 1 part of Portland cement, 5 parts of sand, and 7·5 parts of coke breeze. On the top of the blocks and the "webs" concrete 1½ins. (·0380m.) thick was filled in, composed of 1 part of Portland cement and 3 parts of shingle, passing ⅜in. (·0095m.) mesh, of sufficient consistency to fill the crevices between and at the top corners of the blocks, and was well rammed. The soffit was rendered with plaster composed of 2 parts of cement, 1 part of sand, 2 parts of powdered breeze, and 2 parts of fireclay, and the setting coat was Sirapite.

The webs and cylinders were made on the site.

The objects of the test may be described as follows, according to the official report :—To record the effect of a fire of four hours' duration, the temperature to reach 1,800 deg. Fahr. (982·2 C.), but not to exceed 2,200 deg. Fahr. (1,204·4 C.), followed by the application of water for five minutes, with a view to classification under "Full Protection" (Class B).

Note.—The area of the floor under investigation was to be at least 200ft. sup. (18·58 □ m.). The floor was to be loaded with 280lbs. per square foot (1,376kg. per □ m.) distributed.

The time allowed for drying the floor was 47 days (winter).

The area of the floor in this case was 247ft. sup. (23 □ m.).

The load was 280lbs. per sq. ft. (1,367 kg. per □ m.)

The water was applied for five minutes.

The summary of effect is remarkable for the small deflection, having regard to the severity of the fire and its duration. The official summary runs as follows :—

At the commencement of the test the setting coat of the plaster on the soffit of the floor fell.

In 195 minutes a transverse crack was seen on top of floor about 8ft. (2·44m.) from north end between the stacks of bricks forming the load.

The floor deflected downwards during the test to a maximum of ½in. (·0127m.).

On the application of water no effect was produced beyond eroding some of the plaster on the soffit where struck by the jet.

After the load was removed the top surface of the floor showed six transverse cracks.

The permanent deflection of the floor was 7-16th in. (·0111m.). Neither fire nor water passed through the floor.

Classification "Full Protection" (Class B) was obtained.

The test was carried out in accordance with the usual procedure laid down by the Executive of the British Fire Prevention Committee, and it is interesting to note that among the members of the Council present were Mr. W. T. Hatch, M.Inst.C.E. (Metropolitan Asylums Board), Sir Henry Tanner, I.S.O. (H.M. Office of Works), and Sir J. Williamson, C.B. (late Director of H.M. Dockyards). A number of public authorities, institutes, and corporations were represented, and there were also present many district and municipal surveyors. The sub-committee in charge of operations comprised Mr. Ellis Marsland (directing member), Mr. J. Herbert Dyer (vice-president National Fire Brigades' Union), Mr. Oswald C. Wylson, F.R.I.B.A., and Mr. William Grellier, F.R.I.B.A. (district surveyor).

PETROL TANKS AND FIRE RISK.

Apart from the constructional tests undertaken by the British Fire Prevention Committee, that body has recently been conducting various tests with appliances connected with fire prevention, and among the tests of last week were further experiments with fire extinguishers (mainly with the extinguisher known as the "Minimax") and an important series of tests with petrol safety tanks, or rather petrol tanks fitted with safety devices. With the ever-increasing number of motor garages in thickly-populated districts of large towns, the importance of the storage of petrol cannot be underrated. Not only is there great hazard in the storage of petrol at such garages and in oil stores or general stores, but the actual transportation of this highly-inflammable liquid is a most risky operation.

As far as the petrol tank tests of the past week were concerned, it should be mentioned that the Committee tested tanks fitted with safety devices and tanks not so equipped, and the explosions obtained—of a very severe character—with tanks not fitted with the safety devices were a striking proof of the necessity of precautionary methods having to be taken. The detonation and force of explosion of petrol tanks is no small matter. The tanks fitted with safety devices will be reported on fully, and it can only here be stated that a series of such tanks, of various sizes and shapes, was under investigation.

A NEWCASTLE FIRE.

For the accompanying view of the chemical works of Messrs. Ismay & Co., in City Road, Newcastle-on-Tyne, we are indebted to the "North Mail." The photograph shows how the interior of the building has been gutted and how the roof has completely collapsed, though the front of the building does not seem to have suffered much damage. The total amount of damage done, however, is estimated at £20,000. The fire occurred about a fortnight ago.

THE SCIENCE OF MINIMISING FIRE WASTE.*

By James Sheppard.

Fire waste is a national loss absolute and beyond recovery, but expenditure that prevents such waste is reproductive.

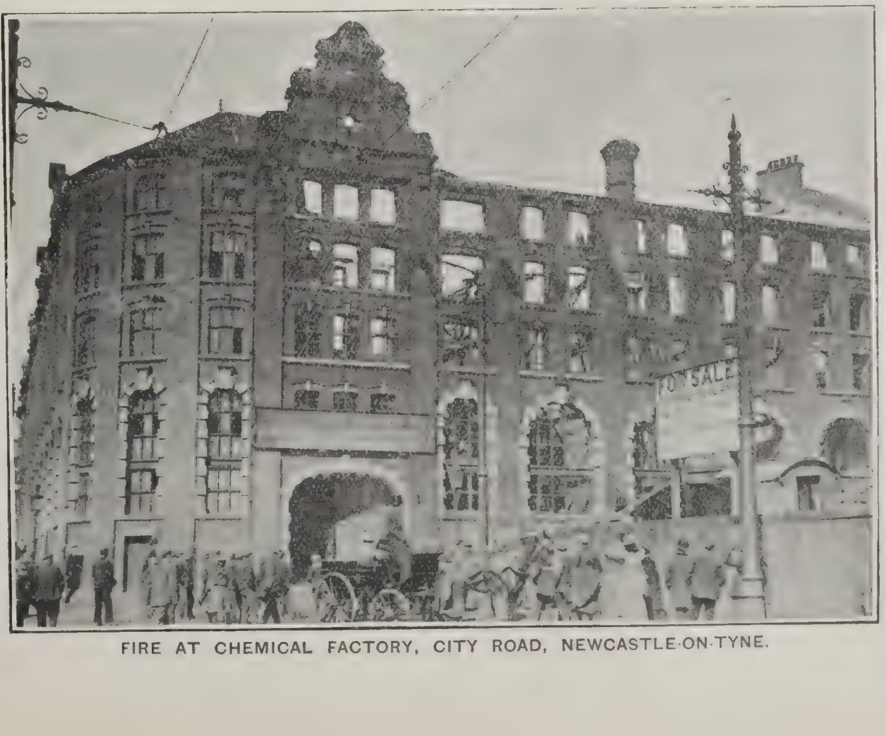
It is sometimes asserted that in fire insurance practice it is only necessary to determine a rate for risks as they exist. Whatever truth there may be in this statement, it is certainly not the whole truth, for we find that proposal forms, tariff or rating schedules, rules and regulations in general use by all fire offices, contain provisions involving the offer of lower rates, on the isolation of elements of hazard, the provision of suitable water supply, extinguishing appliances, and fire-alarms.

These principles were acted upon, although somewhat crudely, during the earlier years of fire insurance, when each office maintained fire-brigades and salvage corps of their own in important cities where they were largely interested. In London these brigades were ultimately organised under one chief, and rendered excellent public service for thirty-three years, from 1833 to 1865.

The duty of extinguishing fire is now very properly left (as it always should have been) to local authorities, who, in view of their public character and general powers, are better able to undertake such duty, leaving the fire offices free to apply their experience and influence to encourage the adoption of measures proved by experience to be reliable for preventing the outbreak and spread of fire.

In this direction during recent years considerable advance has been made amongst various classes of risks by the operation of rating schedules, and in some instances by constant inspections.

The system of improving and protecting risks by the application of scientific rating, with the object of minimising fire waste, is shown to have met with marked success. The soundness of this system being admitted and its application proved to be successful, it is in every way desirable that it should be carried out to the fullest extent possible. To accomplish this it is increasingly necessary to adopt scientific methods. The entire range of



FIRE AT CHEMICAL FACTORY, CITY ROAD, NEWCASTLE-ON-TYNE.

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* A paper read before the Insurance Institute of Manchester.

applied science has in one or other direction a direct bearing on fire waste, but it is manifestly impossible in a short paper to cover so wide a field. All that can be attempted is to give a brief summary of methods by which two branches of science—namely, economics and physics—may be applied to secure to some extent the end in view.

The science of economics as applied to minimising fire waste may be taken to include the collection and tabulation of experience in the various districts of the country, on all subjects relating to fires, and may be summed up in the direction, "Observe and Compare."

Such science has not been applied in this country to any appreciable extent. If it had, we should now find available full information for different periods with regard to the following facts :—

1. The number and extent of fires throughout the United Kingdom, and the nature of the property affected.
2. Their cause or point of origin.
3. The amount of waste they occasion.
4. Full information regarding conditions which allowed the spread of fire through the building first involved, and to surrounding buildings where "spreads" occurred.
5. Previous fires on same premises. Persons having previous fires.
6. The number of workers thrown out of employment in consequence of fires, with the probable amount of wages lost.
7. The number of lives lost or endangered.

This information, tabulated under the various industries and occupations for each city, borough, urban, rural and parish districts throughout the country, would be of the utmost public value.

In the absence of definite official information on the above subjects, it is not possible to secure the application of effective remedies, or even to know whether the fire waste is increasing or diminishing.

The need of Official Returns.

That serious evil results from the absence of all public information on these subjects was acknowledged by the Parliamentary Select Committee on Fire Brigades, who reported in 1900 that they had "been unable to get information to enable them to make an estimate or even to form an idea of the number of fires in England and Wales, or of the value of property destroyed by fire," and they recommended "that in order to ascertain the loss of life and property occasioned by fire, authorities should be required to send to a Government department full particulars of all fires as they occur, and that annual reports should be published containing the information so obtained."

The mere publication of such official returns, giving all the information previously suggested, would alone be sufficient to effect a great reduction in the fire waste of the country, by impressing on local authorities, owners, occupiers, and employees a sense of their duties and responsibilities, and by showing the serious results of ignorance, negligence and carelessness.

Authoritative information with regard to the number of workers thrown out of employment, and the amount of wages consequently lost through fires would probably induce trade unions to apply their influence towards minimising fire waste, and call the attention of their members to the necessity in their own interest of exercising reasonable care in connection with their work.

The Factory and Workshop Act of 1901 requires occupiers to report and keep a register of every accident that may incapacitate an employee from following his or her usual employment for five hours on any one of the three working days following an accident, now proposed to be altered to disablement for one clear day. This requirement, without causing further appreciable trouble or expense, might be extended to include reports of all fires that may occur in the factories, workshops, or other premises under inspection.

Factory inspectors now examine the means of escape provided for workers in case of fire. The receipt and tabulation of reports on fires forms an important branch of the same subject, and the publication of such reports would tend to prevent fires. A list of fires with particulars regarding them, as previously proposed, for all factories, workshops, laundries and other premises now under inspection, amounting to a total of 257,130 establishments, would be of great service, pending the more complete returns recommended by the Parliamentary Committee on Fire-Brigades.

Many of the writers of papers on fire subjects read before insurance institutes on different manufacturing risks, acknowledging the importance of such particulars, have given tables showing the number of fires, with their causes and the amount of losses, during a few years amongst the class of risks under consideration, but nearly all state that they have experienced great difficulty in obtaining this information and that their lists are incomplete.

One of your vice-presidents has suggested that, with the approval of the managers and the co-operation of the assessors, the federated institutes would be well able, so far as the provinces are concerned, to undertake the compilation of complete fire records year by year. If the institutes would undertake this work the result could not fail to be highly appreciated, especially if the records included full information on the subject before-named.

Cotton Mill Fires.

Very valuable tables of cotton mill fires and their causes have been prepared by Mr. Thomas A. Bentley, another of your vice-presidents, who has kindly completed them up to 1903. (See below.)

While the number of fires in cotton mills was nearly 15 per cent. less during 1899—1903 than during the previous five years, the proportion of these fires of known origin in cotton mills, caused by friction of machinery, wheels and shafting, is shown to be increasing, the ratio of such fires for the five years 1899—1903 being 66·3 per cent., against 61·88 per cent., 59·52 per cent., and 61·0 per cent. for the three previous quinquennial periods. This

English Cotton Mill Fires.

(The percentages are of the total fires of known origin.)

Causes of Fires.	1879-1883.		1884-1888.		1889-1893.		1894-1898.		1899-1903.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Eer cent.
Friction—										
In machinery	90		97		144		103		63	
In wheels	—		—		1		—		—	
In shafting	1		—		5		2		—	
	91	70·10	97	61·0	150	59·52	105	61·88	63	66·3
Blowing Rooms—										
Hard substances in the cotton under process, in mixing, blowing, and scutch rooms	9	6·91	27	17·0	65	25·8	50	29·36	2	2·1
Artificial Light—										
Gas	17	13·05	9	5·66	14	5·55	3	1·76	11	11·6
Lamps	1	0·76	—	—	1	0·4	1	0·58	2	2·1
Electric	—	—	—	—	—	—	1	0·58	1	1·05
Spontaneous Ignition—										
Amongst cotton dust and fluff	7	5·36	5	3·14	3	1·19	—	—	6	6·3
Matches in Cotton—										
Treading on and striking ...	—	—	8	5·05	4	1·58	—	—	3	3·2
Adjoining and defective buildings and exposure	1	0·76	4	2·52	4	1·58	10	5·84	1	1·05
Millwrights and workmen ...	1	0·76	—	—	4	1·58	—	—	2	2·1
Straps and shafts breaking ...	3	2·3	1	0·63	—	—	—	—	—	—
Lightning	—	—	—	—	1	0·4	—	—	2	2·1
Gasing	—	—	—	—	—	—	—	—	1	1·05
Outbreak of previous fire supposed to have been extinguished	—	—	—	—	—	—	—	—	1	1·05
Skips on fire	—	—	—	—	2	0·8	—	—	—	—
Drying in boiler house	—	—	2	1·25	2	0·8	—	—	—	—
Stove and oil house	—	—	2	1·25	1	0·4	—	—	—	—
Fire works back draught ...	—	—	2	1·25	—	—	—	—	—	—
Suspicious incendiary	—	—	2	1·25	1	0·4	—	—	—	—
	130	100	159	100	252	100	170	100	95	100

Total of all fires in English cotton mills of known and unknown origin.

	1879-1883.		1884-1888.		1889-1893.		1894-1898.		1899-1903.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Total number of fires of known origin	130	67·36	159	70·0	252	70·6	170	77·6	95	50·54
Number of fires the origin of which unknown or not noted	63	32·64	68	30·0	105	29·4	49	22·4	93	29·46
	193	100	227	100	357	100	219	100	188	100

result indicates that the form of bearings and gear, methods of lubricating or the lubricants in general use, are not equal to the stresses resulting from the increased speed at which machines and spindles are now run, and suggests that a close study should be made of the whole question to find an effective remedy. The fiery headstock will surely admit of being tamed, or at least caged.

Fires in mixing and blowing rooms, causing damages exceeding £100 each, have been brought down to a total of two during the five years ending 1903, equal to 2·1 per cent., the proportion for the previous five years being 29·36 per cent., partly owing possibly to a different system of compiling the tables, but this result is also largely due to conducting these first processes in distinct risks with complete separation from the mill and the provision of hand-extinguishing appliances and sprinklers, as encouraged by scientific rating.

It is desirable that all fires should be included in any tables that may be prepared, as most useful lessons are frequently taught by small fires, the origin of which can usually be definitely ascertained. All large fires have small beginnings.

When making comparisons between the different causes of fires amongst similar classes of risks, it is desirable to take as the total the fires of known origin only, fires of unknown origin being treated separately. The term "unknown" cannot properly be included as a cause of fire. Fires of unknown origin may usually be assumed to have resulted from similar causes, and in like proportions to that of fires of known origin.

Fires the causes of which are not ascertained require careful consideration, as they comprise most large fires which usually destroy all trace of their origin. If such fires show a high percentage of the total number in a given class or district, questions of ignorance, neglect or of wilful carelessness constituting "moral hazard," may be involved, calling for strict investigation into all the circumstances connected with such fires.

The usual practice in the United Kingdom of granting contracts of fire insurance without average or co-insurance conditions is contrary to the science of economics, being unjust to the more prudent insurers. The cost of and consequent charge for insurance is necessarily governed by the experience of fire offices on different classes of risks in different localities. In the absence of conditions referred to this experience is unfavourably influenced by under-insurance on the part of many insurers. This tends to prevent reduction in premiums, as persons who insure for only half the value of their property, involving the office in a greater number of total losses, pay no more per cent. than persons who insure for full values.

This probably operates more fully in cities having efficient water supplies, fire-brigades and building regulations, relying upon which many insurers are content with under-insurance, thus preventing a general reduction in insurance rates which might otherwise be secured in districts so provided.

In the interest of the public simple average or co-insurance conditions should be applied to all fire insurance contracts.

The physical conditions chiefly responsible for fire waste as regards structures and their use, so far as at present known, appear to be :—

1. Site, plan, surroundings, exposure.
2. Construction, materials used, methods of their application.
3. Extent of open floor area, capacity, height.
4. Openings for light and other purposes through floors. Unenclosed lifts and staircases.
5. Concealed spaces between ceilings and floors, in partitions behind surface finishings; nature of such finishings, casing, trunks, spouts.
6. Enclosed and undivided roof spaces.
   With regard to roofs as usually constructed in this country it has been remarked by a great authority that a form of timber construction, forbidden on the ground level, is sanctioned for the top of buildings, where it involves far more danger.
7. Appliances for artificial lighting and warming, with their efficient maintenance and control.
8. Fireplaces, flues, furnaces, drying-rooms, stoves.
9. Methods for producing, transmitting and applying power.
10. Running machinery of all kinds.
11. Lubrication and lubricants.
12. Storage classification and display of merchandise and general goods, wholesale and retail.
13. Nature and inflammability of all kinds of materials separately and in combination, and under process of manufacture or heating.
14. Atmospheric influences on different substances, spontaneous ignition, waste materials, cleanliness, management.
15. Water supply—volume and pressure. Extinguishing appliances—manual and automatic. Fire-brigades—private and public.
16. Fire watch, fire-alarms.

The scientific study of these and other conditions which originate or assist the spread of fire, and the application of scientific methods for minimising the fire wastes they occasion, may well occupy all the energies of the fire section of insurance institutes.

Recent Mill Fires.

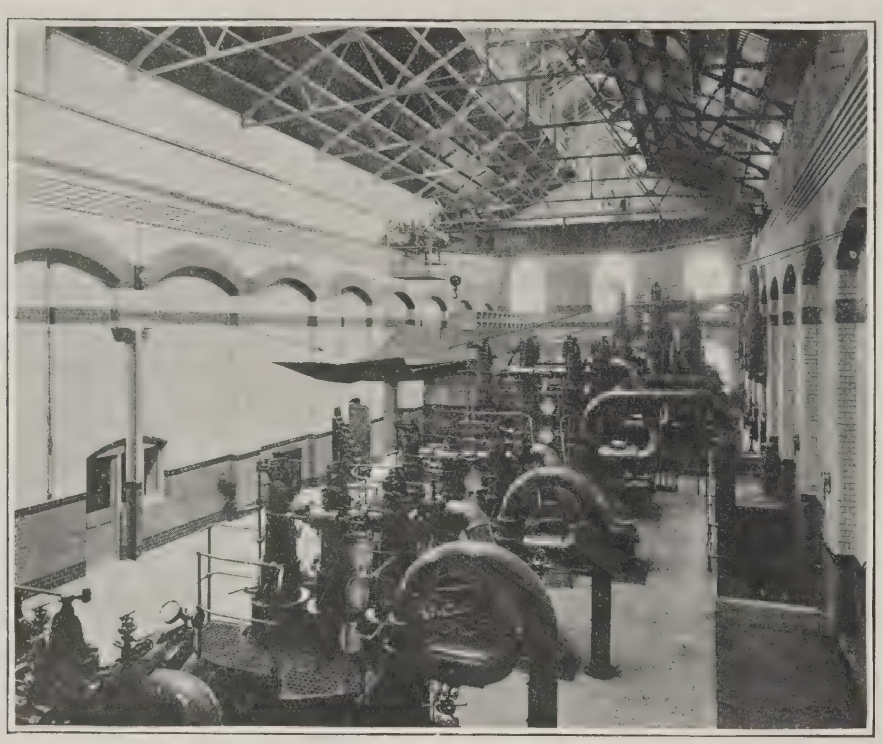
In connection with the foregoing paper by Mr. Sheppard, and the references made in it to cotton mill fires, it is interesting to note three recent fires at Burnley, Blackburn and Gilnow, which are typical of such constantly-occuring outbreaks. The fire at Burnley broke out on March 11th in the mule-room of the Victoria Spinning Mill. It occurred on the second storey, but with the aid of sprinklers and the firm's fire appliances the fire was confined to the room in which it originated; considerable damage, however, was done to the lower rooms by water. The Blackburn fire occurred in the mixing department on one of the upper storeys of the Highfield Mill. It was caused by some foreign substance in the machinery. The fire at Gilnow, near Bolton, occurred on April 13th, in the mill belonging to the Melrose Spinning Co. It appears that men were engaged repairing the mill gearing, when flames were seen on the second floor. They travelled to the third floor, setting a mule carriage alight, and afterwards to the fourth floor, setting another carriage alight. The mill is supplied with sprinklers and these acted promptly, so that, with the aid of the fire-brigade, a plentiful supply speedily deluged the premises, and the damage done (estimated at £15,000) was chiefly due to water.

FIRE ALARMS IN HOTELS.

In the course of the paper on "Hotel Planning" which he read before the Royal Institute of British Architects on Monday, April 8th, Mr. Stanley Hamp referred to the matter of fire alarms in hotels. There were, he said, two questions of great moment to be considered—namely: (1) Should the alarm be a universal one, or (2) should the alarm be given only to the officers and the staff? In his opinion the latter course was the correct one. "If a universal alarm be given a serious panic might easily arise, whereas the action of a well-trained staff might avoid a serious outbreak in the event of actual danger. If we agree that this system is best, let us deal with it accordingly. In a suitable spot in each corridor on every floor of the hotel should be fitted a fire-alarm contact, preferably in a cast-iron case, and of the 'Break-the-glass' type, which is the most efficient contrivance at present upon the market. Inside the box is a metal plunger, which presses aginst the glass and comes forward as soon as it is broken and gives the alarm.

"One service-room on each floor should be equipped with an indicator and an alarm bell. On the face of the indicator would be numerous little apertures of about one inch square, each aperture representing a corridor on the various floors. Hence, should a fire break out in the main corridor on the sixth floor, and the alarm be given in the manner already indicated, the bell would ring in the service-room on each floor, and upon every indicator would appear a red disc in the aperture, indicating, for instance, 'main corridor, 6th floor.' Then the staff on each floor would know exactly in which corridor the fire had broken out.

"Fortunately, some time has elapsed since we were electrified with vivid reports of the last great hotel fire, and the hope is, of course, that the warning thus given has had its due effect. It is undoubtedly true that most of our London hotels are to a certain extent safeguarded against fire; but whether the means taken are sufficient to ensure complete safety, time and experience alone can tell. It must not be forgotten that the danger is always with us. The Savoy Hotel, being one of the largest in town, is well provided with means of escape; and if a fire occurred there would be little chance of it spreading. There are buckets and hand-pumps, &c., on every floor, and the building is divided into sections by fireproof doors. The Grand Hotel is also practically safe against a big outbreak. It is in the hands of two firemen and twenty-eight well-drilled manservants. The building is patrolled every night by a fireman, who has to record his movements by an electrical device connected with the manager's office. Similar arrangements are made at the Hotel Metropole. Here I understand that there is an arrangement with the superintendent of the Fire Brigade at Scotland Yard to put the men through their paces once a week; often an electric fire-alarm is rung without any previous warning to test the efficiency of the staff. The danger of a fire and consequent panic in an hotel filled with guests is one surely which should be well pondered over by the proprietor of every establishment."

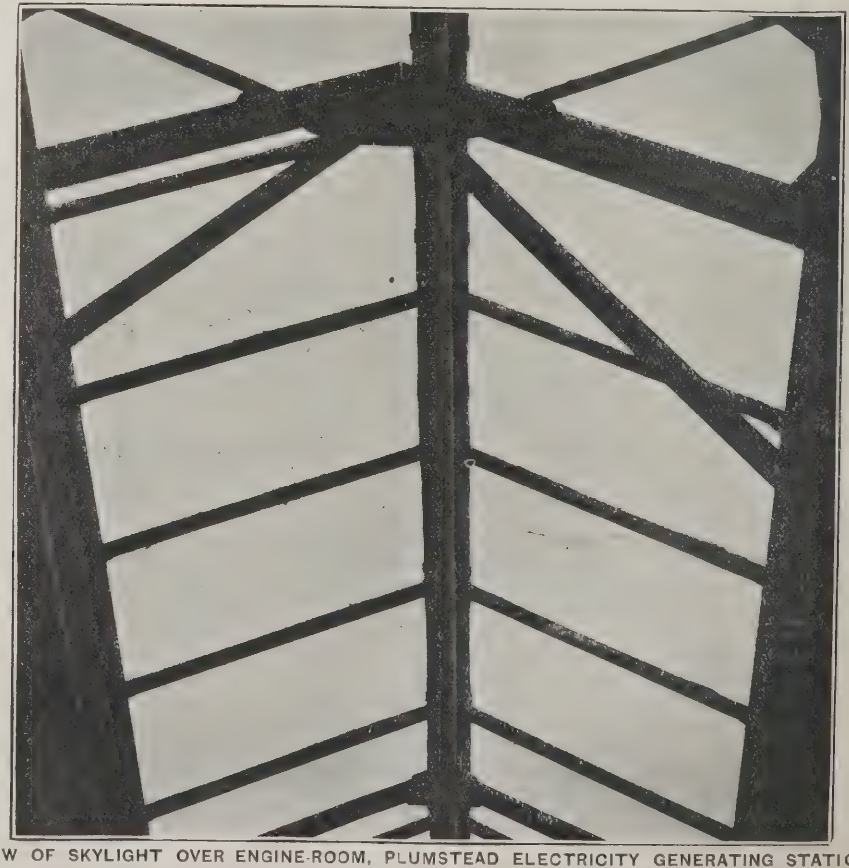


PLUMSTEAD ELECTRICITY STATION: THE ENGINE-ROOM.

THE WOOLWICH EXPLOSION.

The two views of the Plumstead electricity generating station which we reproduce on this page are of particular interest in relation to the explosion that occurred at Woolwich Arsenal on February 11th last, an explosion so violent that windows were shattered for miles around. The Plumstead electricity generating station, a fine modern structure equipped with a large and valuable plant, is only about 500yds. from the site of the explosion. Most of the vertical windows were blown in or out by the terrific concussion, and the door of the engine-house was torn from its hinges and hurled against an iron column supporting the switchboard gallery, but the skylight extending the whole length of the engine-room remained intact. It is easy to imagine what extensive damage would have been caused if the glass had been shattered, and had fallen on the Westinghouse engines and dynamos below. This skylight, however, was not of ordinary glass, but of patent wired rolled glass manufactured by Messrs. Pilkington Brothers, Ltd., of St. Helens, and no more convincing illustration of certain of the valuable qualities of wired glass could possibly be given than by this explosion. The vertical sides of the lantern were glazed with ordinary glass, and a large proportion of this was shattered and fell, whereas of the 122 large panes of wired glass in the skylight, though 44 of them were cracked by the explosion (as the accompanying photograph shows), not one of them fell from its frame. It will be recollected that the explosion occurred at 3 o'clock in the morning. Had it occurred in the daytime, when the engineers would be moving about amongst the machinery, the result might have been fatal. This occurrence should cause employers of labour to provide the safeguard afforded by the use of wired glass in such places where their employees are exposed to possible catastrophe. There is no doubt that if the skylight of the Plumstead electricity generating station had been glazed with ordinary heavy rolled plate glass the whole of it would have been brought down by the concussion, with results that can be imagined.

In this connection it is opportune to point out, further, that wired glass has also a special merit as a fire stop, as we have shown on several occasions by illustrations in this supplement. It should be remembered that the falling out of windows is one of the first effects of a fire, whereby an increased draught for the flames is provided, without which the fire would be unable to increase or to spread to adjacent buildings.



VIEW OF SKYLIGHT OVER ENGINE-ROOM, PLUMSTEAD ELECTRICITY GENERATING STATION, SHOWING WIRED GLASS CRACKED BUT STILL IN POSITION AFTER EXPLOSION.

FIRE-RESISTING CONSTRUCTION.

An Important Report.

We have dealt before with the San Francisco fire, but the magnitude of this conflagration, and the many lessons it teaches, are of such high importance that we have to refer to the subject from time to time as new data are put before us.

The American Society of Civil Engineers referred the whole question of the San Francisco earthquake to a special committee to deal with, comprising men of the highest engineering skill, and these gentlemen, on Wednesday last (May 1st) reported on the whole disaster in the form of a most extensive paper, of which we have an advance proof.

The portion of the report dealing with the fire question is a most valuable one, so much so that we quote parts of it *in extenso*. We would specially refer to the sub-section dealing with floors, and also to the so-called "Conclusions."

The Fire Damage.

In commenting upon the destruction by this fire, it must be borne in mind that no water was used on any of the materials. Hence, in some cases, the damage is less than it might have been had water reached the materials while they were hot.

Of the buildings within the burned area, estimated at nearly 20,000, only some 50 or 60 remain standing. All others are completely destroyed, only some brick walls standing here and there. Unless one has been an eye-witness, it is difficult to realise how all materials that men make into the shape of buildings can be so utterly destroyed in a general conflagration.

It would be well to state that when the phrase "complete destruction" is used, it means that the part is destroyed so that it is unfit for further use. Under this a disintegrated terra-cotta floor or a leaning brick wall, or a bent steel beam is destroyed, even if the part may be again re-shaped and used.

Bearing in mind the definition of "complete destruction," it can be said that all materials were destroyed when directly exposed to the fire for any length of time. Bricks, terra-cotta, granite, marble, sandstone, steel, cast-iron, concrete, plaster cement, timber—all failed. Especial emphasis is placed on this point. Anyone with an interest in any one material can find evidence to support a claim for it; yet impartial observation leads to the conclusion that, when a material was subjected to what would be considered a test fire, it was destroyed.

Front Walls.

All ordinary methods of construction were exposed to the fire. Granite suffered more than any other stone, spalling badly wherever exposed. Marble fared nearly as badly, and sandstone slightly less. With all there was complete destruction. No limestone fronts had been used. Of the terra-cotta fronts, most were destroyed. Glazed terra-cotta blocks used in court walls were generally cracked. Terra-cotta bricks spalled everywhere. Moulded terra-cotta brick and pressed brick withstood the fire best of all, but were spalled where much exposed. Terra-cotta brick with rounded corners fared best, sharp edges cracking off.

Stone, brick, or terra-cotta was used around windows, and here the damage was the worst. In relation to this, it may be said that terra-cotta is deceptive, in that it retains its form after being destroyed. Many fronts, apparently in good order, must be removed. In the Mills Building there was hardly a window opening in which the terra-cotta sills, jambs and heads were not badly cracked, though from the street they had the appearance of being in good order. Walls of ordinary red brick and mortar were destroyed in many cases. The damage to standing walls in all buildings was the spalling of the red brick, sometimes to a depth of one inch.

Floors.

Only two kinds of floors were exposed: terra-cotta and concrete. Of the two, terra-cotta suffered the more, being in all cases, where directly exposed, completely destroyed. Terra-cotta floors, built with flat arches and with plaster applied directly, were all destroyed. The general effect was a spalling of the lower section of the tile structure and a disintegration of the mortar joints. The tile also became brittle, breaking with a slight blow. All terra-cotta was of the dense type, no porous tile being used. In the James Flood Building tile arches were used, being of the regular arch construction. They were covered with four inches of concrete, and protected by a wire-lath ceiling. They escaped injury except where the ceiling lath fell, and there the lower layer spalled off.

Concrete floors generally had hung ceilings, and where thus protected were uninjured. Where exposed, the concrete is in most cases destroyed. The concrete is dry, and while in many cases hard, yet all the water had been burned out, and it may be said to be destroyed, even if able to support weights. Floor coverings of wood invariably burned, adding to the destruction. Sleepers were generally burned. Surfaces of cement mortar fared much better, the linoleum covering remaining practically intact.

Partitions.

Partitions were of terra-cotta tile, and of wire-lath and plaster, either solid or hollow. All kinds were destroyed. In the tile partitions the mortar joints were disintegrated, the plaster was destroyed, and the tiles made brittle. One could pull down with the hand any partition in the Mills Building, all of which were of tile. Metal lath and plaster partitions were completely wrecked, but the lath might be considered as salvage. The use of wooden grounds around doors and transoms helped the destruction, but it is difficult to see what would have prevented the damage.

Ceilings.

Where ceilings were made directly by plaster upon terra-cotta flat floor arches they were completely destroyed. Where metal-lath hung ceilings were used the plaster was destroyed, but the lath generally remained in place, and was not damaged. Where copper wire was used to fasten the wire lath it failed, dropping the ceiling. Such wire should never be used.

Conclusions.

Any deductions from the fire must be those based up on a general conflagration, and not those of an isolated fire. In view of the complete destruction of all materials it becomes a question as to what should be done to make a building fireproof.

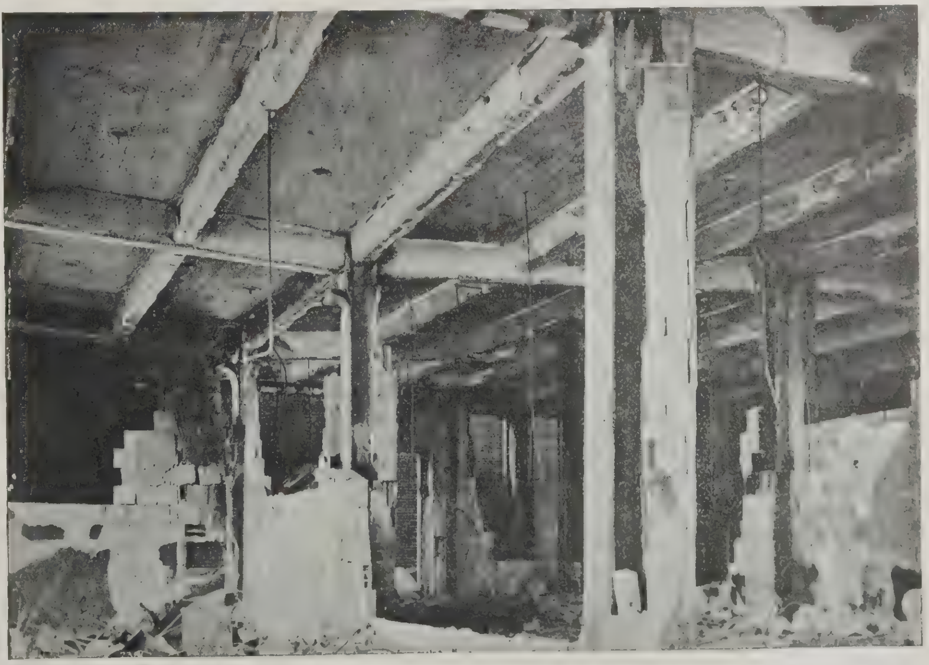
Turning to the individual building, the question of the exterior walls must be settled. There does not seem to be much choice of material. Architectural considerations demand the use of brick, terra-cotta or stone. With a steel frame supporting the walls at each storey, any local fire will destroy the near-by facing, but it may be removed without damage to adjoining parts. This cannot be done when the walls are self-supporting, and the facing acts as a part of the wall. The risk of damage must always be carried, gradually becoming less as inflammable buildings are eliminated.

There is no doubt that the steel-frame building is adequate for all its purposes, but it must be protected. This brings up the general subject of fireproofing, in which is involved the construction of floors and partitions, and ceiling and column protection. Where any reasonable protection was given the steel frames of buildings in San Francisco, the steel was uninjured, and hence the writers feel warranted in stating that it is possible to protect such a frame so that it will pass uninjured through a fire that consumes all parts that can burn.

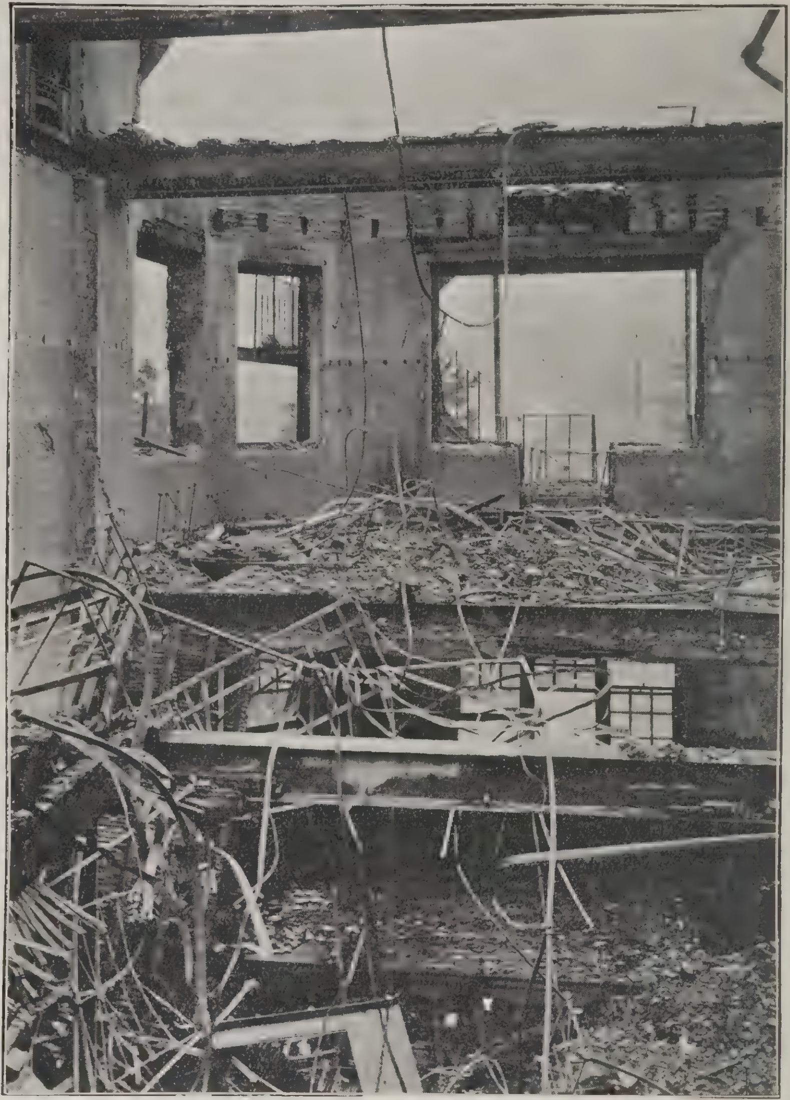
It was stated previously that all materials were destroyed by fire; it follows from this that the destruction of fireproofing must be expected, and it will have to be restored after a fire. It becomes a question, then, of selecting the material that will stand up best, for the fireproofing must retain its form, even if destroyed.

In the writers' judgment, the column should be of a closed form, such as channels and plates. This is preferable to latticed columns. For columns, the fireproofing that will stand up best is red brick set in Portland cement mortar. Equal to this is a casing of solid concrete at least four inches thick, with a mesh of reinforcing metal. Examples were found in the St. Francis Hotel and Shreve Building, where the concrete was uninjured. In the Fuller Building, which was used as a paint and oil warehouse, the floors were of wood, and the columns were covered with from four inches to five inches of concrete. This protection held in place when the columns fell. It was completely destroyed, but the column shafts were protected. Next in order, and of equal merit as far as examples show, is the double wire-lath and plaster protection, which in the Wells Fargo Building afforded complete protection. In many buildings columns were protected by one layer of lath and plaster, directly applied, and then the entire column, with pipes, &c., was enclosed by the regular partition. This afforded complete protection.

The remaining examples of column failures must be laid to the failure of terra-cotta tile. As the failure of one column section means the practical destruction of all floors supported by that column, the re-



TERRA-COTTA TILE COVERING TO COLUMNS AND BEAMS, "ARONSON" BUILDING, SAN FRANCISCO.



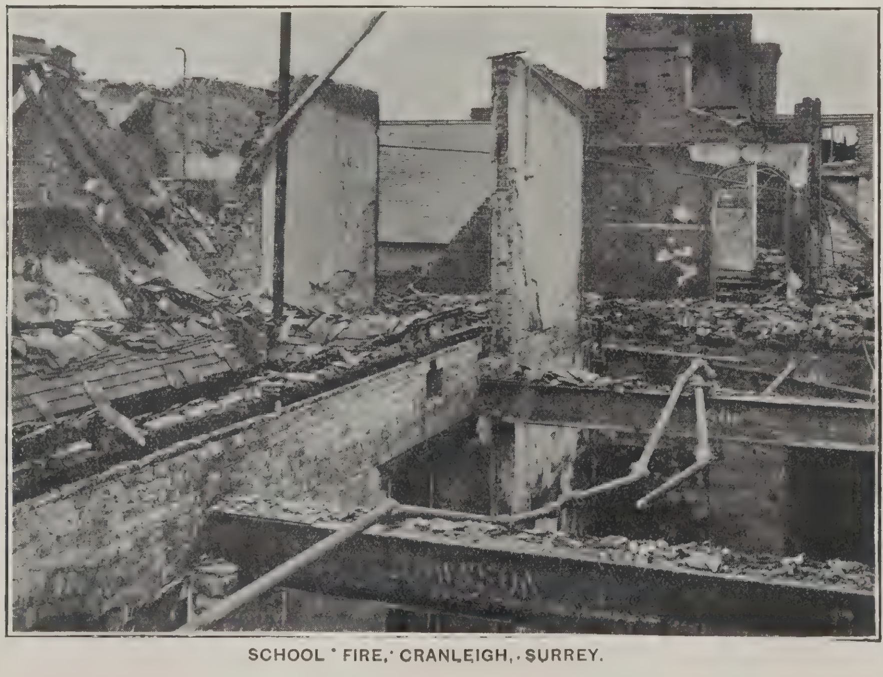
SCHOOL FIRE, CRANLEIGH, SURREY.

sults are serious. In justice to the terracotta tile, it must be said that in the St. Francis Hotel, the Union Trust and some other buildings, it stood up well enough to protect the columns. The writers believe, however, that it is the least valuable of all materials commonly used for fireproofing.

For floor construction some form of reinforced concrete is far preferable to tile. In all cases the record of concrete is better than that of tile. Connected with this is the protection of the lower flanges of beams and girders. The fire shows that a cover of lath and plaster directly upon the flange, protected again by the suspended ceiling, is the best. The layer of plaster alone on the flange will not protect. Neither will the thin piece of terracotta strapped on. It may be stated here that one of the most obvious lessons taught by this fire is the protection of concrete floors and floor beams by the suspended ceiling of lath and plaster. In all cases where used it afforded complete protection. Where not used, concrete was destroyed and beams distorted.

A logical deduction from the statement that all materials were destroyed is the conclusion that all structural parts of a building, of whatever material constructed, must be protected by another complete material which will be a more or less complete loss in a fire. This applies to a steel frame, to floors of any type, and to roofs. It is impossible to protect some parts, such as fronts, partitions and other parts directly exposed. The floors and frames constitute the structural parts, failure of which means destruction of the building. All such should be fireproofed. This remark applies with equal force to buildings with reinforced concrete columns, girders, beams and floors. As integral structural parts they should be fireproofed as well as similar members of a steel frame structure, for concrete is destroyed by fire nearly as quickly as steel.

No further comment will be offered, except the following. Buildings with wooden floors will be completely destroyed in a fire. Such parts as metal trim, wire glass and steel shutters were not used to a sufficient extent to warrant any definite conclusions, except to say that what showing there was was favourable. Whether this expense is warranted was not determined. Bad work and indifferent construction will cause any material to fail. Good work will enable a poor material to stand up. Fireproofing should be continuous, and at no place should it be cut into for the passage of pipes, &c. The subject of pipes should be treated as it deserves, and proper ducts and shafts should be provided, instead of allowing them to be placed anywhere.



SCHOOL FIRE, CRANLEIGH, SURREY.

A SCHOOL FIRE.

Two views on this page show the ruins of a fire which occurred on April 11th last at St. Catherine's School, Cranleigh, Surrey, it having been fired by lightning. It is rather surprising that, although the building was practically burnt out, the steel girders remained in place, apparently uninjured. We must attribute this to low temperatures, the building not having been stored with heat-producing material like a warehouse. The steelwork was carried out by Messrs. Drew-Bear, Perks & Co., Ltd., of Battersea Steel Works, Wellington Road, London, S.W. (who kindly supplied us with the accompanying photographs, or, rather, by their old firm, whose name, Rownson, Drew & Co., is to be seen stencilled upon the girders in the smaller of the two views. Fire-escape staircases were provided, but the floor construction should have been fire-resisting. Apparently the building was also unprotected against lightning. This fires serves to emphasise the importance of adopting all safeguards, even in small country schools, just as it is always admitted as necessary for factory buildings. Architects specialising in school design unfortunately do not seem to have quite grasped the importance of considering such points.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
June 5, 1907.
FIRE SUPPLEMENT (MONTHLY).
Vol. XXV, No. 643. 6, Great New Street, Fetter Lane, London, E.C.

FIRE TEST ON A GIRDERLESS FLOOR.

Various efforts are now being made to construct floors of a considerable span without the use of steel girders. This is one of the *raisons d'être* of reinforced concrete work, and latterly there has been a combination of brick, porous brick and the like with reinforced concrete, having the same end in view. An important test in this particular direction was undertaken recently by the British Fire Prevention Committee. It is reported upon in their Red Book No. 118. The test was with the Eggert girderless system of floor construction, the inventor of which, we believe, is an official in the public service at Berlin, of considerable experience.

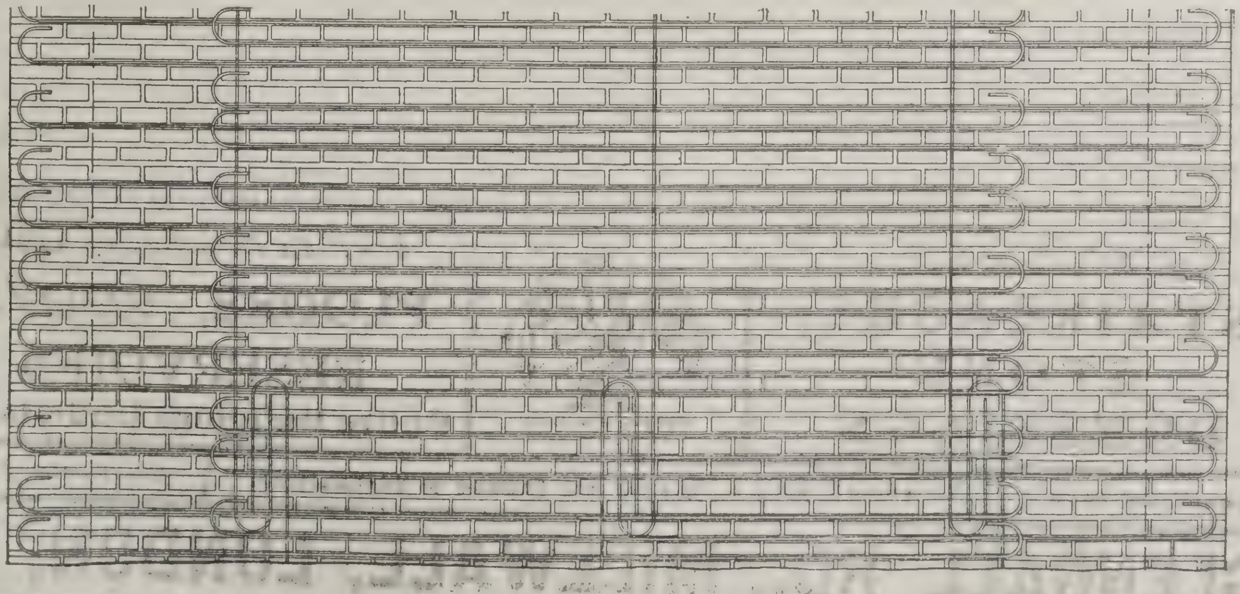
The Eggert floor has already been adopted in several public buildings in Germany. Briefly described, it comprises a layer of stock bricks on end with steel rods between each row of bricks, the steel rods being bent upwards and turning hoop fashion; the whole being covered with concrete, which fills the interstices between the bricks and forms a top layer over the latter. The actual construction of the floor is perhaps better described in detail by quoting the report. The description reads as follows:—

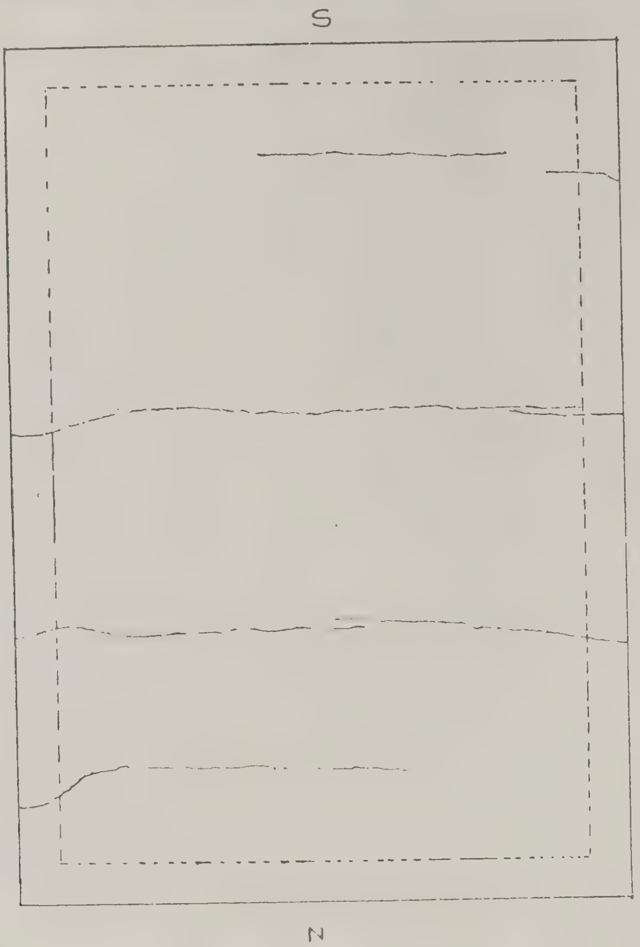
..VIEW OF TESTING CHAMBER AFTER FOUR HOURS.

On October 10th, 1906, wood centering was erected in the interior of the hut about 8ft. 3ins. above the floor level. Directly upon the centering, and traversely across the hut, stock bricks were placed in parallel rows with a space of about 1in. between each row. The bricks were set in mortar composed of 1 part of cement (Ferrocrete brand) and 4 parts of sand. Into three out of every four of the spaces between the bricks wrought-iron bars ⅝in. square were pressed into the mortar joint to within 1½ins. of the centering. The ends of the bars were bent upwards from about 12ins. from each end, and the ends were terminated by a hook of about 6ins. diameter which projected above the top of the bricks. The total length of each bar was about 15ft. 9ins., the nett length from hook to hook was about 14ft., and the weight was about 20½lbs. each. The total weight of the ironwork in the floor was 1,295lbs. The iron bars were disposed in the joints between the bricks as shown on the drawing. Longitudinally across the hut and on the top of the bricks three rows of iron rods were placed, formed of six lengths of the rods before-mentioned, and overlapping one another in the centre of the longitudinal span. After the rods had been embedded in the joints of the bricks, cement mortar, as previously described, was grouted into the joints to the level of the top of the bricks, upon which was laid concrete 5⅜ins. thick, of 1 part cement (Ferrocrete brand), 1 part granite chippings to pass through a 1in. mesh and 1 part granite chippings to pass through a ¼-in. mesh, and 1 part of sharp sand; completely embedding the hooked ends of the iron bars. The top of the floor was rendered in cement and sand. On October 20th, 1906, the floor was completed. The total thickness of the floor was 9⅜ins. The centering was removed on November 5th, 1906. The top of the floor was kept moist for four days after completion.

The Test.

The floor was tested at the British Fire Prevention Committee's testing station in


PLAN SHOWING PORTION OF EGGERTFLOOR.



PLAN OF FLOOR SHOWING POSITION OF CRACKS ON UPPER SURFACE.

one of the large-size testing chambers, the inside measurements of which are 15ft. by 22ft. 3ins.; thus the span of the floor under test, without any divisional particulars, was 15ft. by 22ft. 3 ins., the superficial area under test being considerably above what is required for standardisation, the standard requirements being a section of floor of 200ft. super.

The object of test was to record the effect of a fire of four hours' duration, the temperatures to reach 1,800 degrees Fahr. (982·2 degrees C.), but not to exceed 2,200 degrees Fahr. (1204·4 degrees C.), followed by the application of water for five minutes, with a view to classification under "Full Protection" (Class B).

Note.—The area of the floor under investigation was to be at least 200ft. super., and the floor was to be loaded with 280lbs. per sq. ft. distributed. These requirements were carried out.

The time allowed for drying was 112 days (winter). The centering was struck after 26 days.

Summary of Effect.

The result of the test is recorded as follows :—

> In 20 minutes the corners of the floor began to rise, producing a horizontal crack under the floor along the walls of the hut, and they continued to rise till the end of the test, when a maximum rise of 3⅛ins. was registered.
>
> In 15 minutes the centre of the floor began to deflect downwards and continued to do so until the end of the test, when a maximum deflection of 3ins. was recorded.
>
> On the application of water no effect was produced beyond eroding some of the mortar joints of the brick soffit.
>
> After the load was removed the top surface of the floor showed four transverse cracks, which in two cases appeared on the underside.
>
> The corners of the floor returned to almost their normal condition.
>
> The permanent deflection of the floor was 1½ins. Neither fire nor water passed through the floor.
>
> Classification "Full Protection" (Class B) was obtained.

Arrangements for the Test.

The general arrangements for the test were on the usual lines—namely, the floor under test was 8ft. 3ins. above the pavement of the testing chamber. The fuel was gas produced at the testing station and regulated carefully by dampers, and two Roberts-Austen automatic pyrometers showed the gradual rise of temperature until 2,000 degrees Fahr. was reached, about 1,500 degrees Fahr. having been reached after one hour and a half.

The sub-committee in charge of the test included Mr. Ellis Marsland (district surveyor) as Directing Member, Mr. James Sheppard (North British and Mercantile Insurance Co.), Mr. Percy Collins, F.S.S., Mr. J. Herbert Dyer (vice-president National Fire Brigades' Union), and Mr. Oswald C. Wylson, F.R.I.B.A. The council of the British Fire Prevention Committee was represented at the test by Sir Henry Tanner, of H.M. Office of Works; Sir James Williamson, C.B., late of H.M. Dockyards; Mr. W. T. Hatch, M.Inst.C.E., Metropolitan Asylums Board; Mr. Edwin O. Sachs, F.R.S.Ed., and Mr. Max Clarke, F.R.I.B.A. There was a very large attendance of public officials from the various departments and municipalities interested in the work, the Admiralty being represented by Sir E. Raban, K.C.B., and Mr. Colson, M.Inst.C.E., and the War Office by the Assistant Director of Fortifications (Colonel Scott-Moncrieff, C.I.E.).

The test was a highly interesting one, having regard to the novel type of construction, which gave an exceptionally effective floor of 15ft. span with a thickness of 9⅝ins. without projecting girders, the maximum deflection being 3ins. and the permanent deflection 1½ins. only.

CUBICAL CONTENTS OF BUILDINGS IN LONDON.

The Shop Question.

The decision of the London County Council to allow Messrs. D. H. Evans & Co. to have sections of their building of a cubic extent of 450,000ft. (the building in question being in Oxford Street, and used for drapery business) is a step in the right direction, so far as the advancement of the drapery trade in the metropolis is concerned, but we trust that due regard will be paid to good planning, thorough fire-preventive construction and efficient fire equipment.

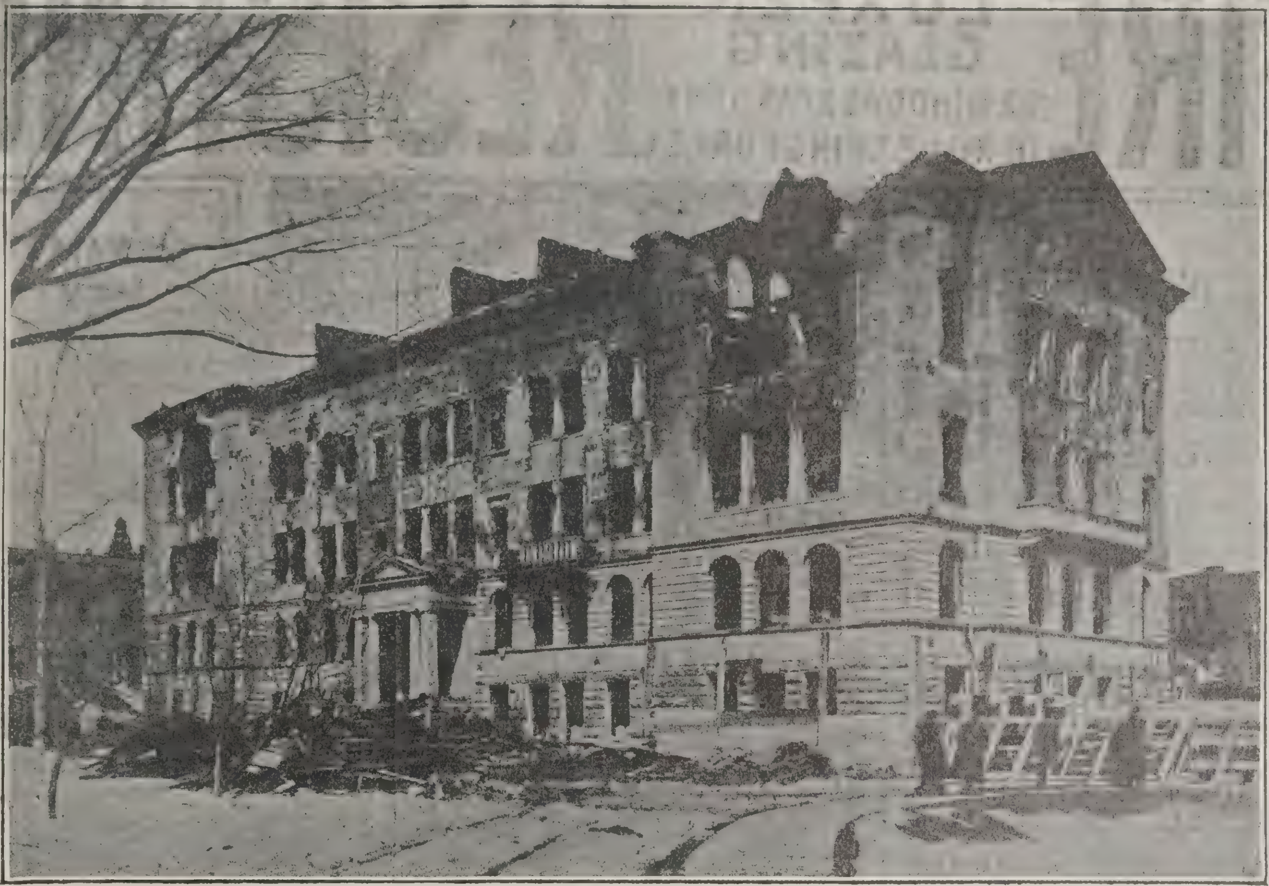
Whilst the Building Act allows the unprotected steel joists and timber flooring so commonly found in West-End drapery stores, it will be impossible to permit great cubic extent, for this unfortunate form of building construction, instead of being fire-preventive, adds fuel to the fire, and creates difficulties for the fire-brigade. If, however, building construction of the very best kind as known in 1907 be applied (instead of the antiquated forms of building construction of 1851, which still, in the main, prevail for the London Building Act) then the cubic extent may be well doubled, trebled, and even quadrupled beyond the 250,000 cub. ft. which is so prominent in the Act of to-day.

Some Definitions.

"Good building construction" we understand to mean sound stock brickwork in mortar, good steelwork, and perfect protection of that steelwork from the effects of fire by a thorough embedment of concrete of not less than 2ins. thickness, and preferably more.

"Good construction" we understand to mean concrete floors (reinforced or otherwise) in which every metal portion is protected by 2ins. of concrete, if not more, and where the concrete itself is of the best Portland cement—*i.e.*, the artificial products with suitable aggregates; further, under "good construction" we require suitable divisional fire-doors in all vertical walls—*i.e.*, double party-wall iron doors, or roller shutters, both protected by drenchers. We should like to see roller shutters and wire glazing (or Luxfer prisms) to all windows overlooking courts, and the wooden casement superseded entirely by the metal casement (either solid or hollow).

We should like to see external risk safeguarded by wire glazing, roller shutters and external drenchers, and suitable divisions of fire-resisting character as between the shop floor areas used by the public and the showcases in the windows, on lines similar to those required in the German building regulations. Then we should like to see automatic sprinklers installed *everywhere* in drapery stores under the Fire Office rules, and, lastly, the most modern facilities provided for calling the fire-brigade and assisting the fire-brigade work, this



FIRE AT ENGINEERING BUILDING, McGILL UNIVERSITY, MONTREAL.

equipment being regularly inspected and properly maintained.

Given these safeguards, the cubic extent of drapery stores might be safely increased, and though we do not go as far as to favour contents of 5,000,000 cubic ft., as found in Paris, we see no reason against cubes of 1,000,000ft. and even somewhat more: the cubes allowed being preferably dependent upon the nature of the surrounding property, and the width of the streets abutting.

As to safety of life, most ample staircases are, of course, also essential, planned on theatre principles.

For a member of the London County Council to get up and speak of automatic sprinklers being "automatically out of order" is quite nonsensical, for it is a well-known fact that in 99 cases out of 100 all over the world a well-made automatic sprinkler will act most efficiently, and that the primary danger is not that of its not acting, but of its getting to work when there is no need for it.

London has been rapidly falling behind other large cities in the United States and on the Continent in its dearth of proper shop accommodation. There are firms to be found abroad that own not one, but several shops, each of a million or more cubic feet contents, and there is not the least reason why our drapery stores should not in design, in elegance, and in the additional cubic contents vie with the foreign establishments. The whole question is one of perfect construction on modern lines, careful supervision, and modern fire equipment properly inspected and maintained.

FIRE AT McGILL UNIVERSITY, MONTREAL

Instances of the want of forethought in protecting the irreparable contents of buildings from destruction by fire are multiplying in the Colonies. The proof of this is seen in the number of recent fires that have been brought to our notice, and the incomparably greater number of instances in past years that have not been recorded. One of the latest experiences is that of the engineering department of the great McGill University at Montreal, Canada. But we had hardly digested the accounts of the destruction of that important building by fire, which occurred on April 5th, than news came of the destruction of another building of the same university on April 16th. This was the medical building.

Above is a view of the engineering building as it looked after the fire, showing that nearly everything in the interior was totally destroyed. The building was erected, fitted up and endowed by Sir William Macdonald, and was one of the best-planned and most perfectly equipped buildings of its kind, comprising innumerable laboratories, lecture rooms, library, &c., and a large technical museum containing the Reuleaux collection of kinematic models—the finest and most complete collection in America. The equipment was valued at £100,000, and the building had cost £30,000. Designed in Italian Renaissance style and constructed of Montreal limestone, it was the largest and most imposing of all the college buildings. It was about 175ft. in length, from 55ft. to 65ft. in width, and comprised a basement, five storeys, and a large amount of attic room.

Professor McLeod, in speaking of the construction, said it was semi-fireproof, and of supposedly slow burning material, yet he never saw a structure give way to the flames with more rapidity. The building was equipped with hose, and he believed that all reasonable precautions were taken to guard against fire. "All of the equipment on three floors has been destroyed, but it may be that the heavier instruments on the first floor are not hopelessly lost. I think that the fire must have been raging long before discovered, and that by the time it finally broke through the roof and upper windows it was vain to try and save the whole place. The floors were of a special thickness; in fact the whole building was erected with a view to prevent the quick spread of fire. But when I came out first the place was burning like a torch." It appears, therefore, that this is but another example of the mistaken application of the system of building advocated by Edward Atkinson for use only in cotton and other mills, which the architects of this country adopted and promoted twenty years ago on the supposition that if some one called it "slow-burning" construction it must be slow burning. It is fortunate that the medical department of Harvard University has secured a new and complete group of fire-resisting buildings to supplant the "slow burning" original structure erected for it about the same time that the engineering building of McGill University was erected. How many more of such institutions of learning are in the same plight?

"HINTS ON FIRE PROTECTION."

It is with great pleasure that we record the publication of a small pamphlet entitled "Hints on Fire Protection" which has been prepared by Captain Hamilton, R.N., Chief Officer of the London Fire Brigade, and which has been published under the direction of the Fire Brigade Committee of the London County Council.

These hints are published both in pamphlet form and in card form, and suitable space has been left on these prints for the insertion (by the purchaser) of the nearest fire alarm, the nearest fire station, the nearest police point, the nearest police station and the nearest telephone.

This small publication supplies a great want, for it gives in a few concise words those particulars which every householder should long ago have known, as to the best means of calling a fire brigade, what he should do towards the extinction of fire, what he should provide in respect of escape from fire, and lastly, though not least important, what precautions he may observe to prevent an outbreak of fire. There is also certain additional information as to insurance, as to the treatment of injured persons, and in respect of the safety of petroleum lamps.

The cards and pamphlets are both published at 1d. each, and should be not only at every householder's office, but in every architect's library.

It is to be hoped that as time progresses it will be found possible to distribute these cards to all householders free of charge, in card form, but it would even yet be better if there could be some enactment by which it was compulsory (as in the case of certain foreign cities) to attach these cards in a conspicuous position just inside the front door of every building. The effect this would have upon the reduction of fire loss in the metropolis could then probably be reckoned in six figures annually.

The question of alarm of fire and the extinction of fire is somewhat outside our purview, but we publish in full the hints given as to the escape from fire and as to the prevention of fire.

Of course, in the majority of cases the architect can do little in obtaining what is suggested, but, on the other hand, there are also a great many points upon which he can use his influence, more particularly in respect of hot walls, chimneys, flues, electric light, staircases, lifts and fire separation generally. The hints so given are as follows:—

Escape from Fire.

Means of Escape.—Two ways or means of escape should be available, and everybody on the premises should be acquainted with them. If it is decided to quit the building, the inmates should make for these points of exit. If one is by the roof, provide a fixed step ladder to the window or opening, and have this exit in a part of the premises separated from the staircase. Trap doors, and locks and bolts to doors, not often used, should be regularly examined and lubricated.

Await Assistance.—When in comparative safety, a person should wait for assistance. Jumping should only be resorted to as a last resource. The bells on the fire appliances can be heard at a considerable distance.

Escape Cut Off.—When the ordinary means of escape is cut off, all places where smoke or gases can penetrate, such as the bottom of doors and elsewhere, should be blocked up by wet towels, &c.

Climbing Down.—When a rope or anything which can be used in place of a rope is available it may be possible to climb down, but before descending, bedding or other soft material to alight on should be thrown out. When persons are being lowered from a window, the rope should be protected from chafing on the sill.

Provide Rope.—A strong coil of rope, sufficiently long to reach from roof to ground, adapted for lowering persons, should always be available in upper storeys.

Points to Remember.—The purest air is close to the floor; a wet handkerchief forms a good respirator and facilitates passing through smoke; and wet clothes or a wet covering thrown over the shoulders will not catch fire.

Prevention of Fire.

Fire Guards.—Good guards should be fitted to all fires and stoves, particularly where there are children, and to fires used for drying clothes.

Clothes should not be placed inside the guard, or on the plate-rack of ranges.

Draughts from open windows or doors blowing clothes towards unguarded fire-grates, and sparks therefrom, are frequent causes of fire.

Hot Walls.—Walls that appear overheated when fires are lighted, should be inspected with a view to the cause being ascertained. Overheating occurs when flues and grates have become defective. When new grates are fitted, they are often badly set, or give a fiercer fire than those removed. Fires should not be raked out at night nor hot cinders left on the hearth.

Chimneys.—Chimneys should be kept in good order structurally, and frequently swept. Wooden beams passing close to flues should be carefully watched.

Iron chimneys and hot pipes passing through walls or inflammable material should be protected by some non-conducting substance.

Inspecting Rooms.—Rooms in which fires or lights are used during the day should be inspected the last thing at night. All rooms should be inspected after workmen have been engaged on the premises.

Smell of Burning.—The cause of any smell of burning should be immediately ascertained.

Oil.—Oil should be stored, as far as possible, outside the house, and extra precautions observed with petrol.

Paraffin, kerosine, petroleum and other inflammable oils require the greatest care, for if upset when alight, they are very difficult to extinguish. Colza oil is the safest illuminating oil.

Oil Lamps.—Oil lamps should be well constructed with a thick strong reservoir (metal for preference) and a broad base. They should be kept scrupulously clean. The cleaning should be done where oil being upset will not saturate wood or other materials. Oily rags and cloths kept for this purpose are liable to cause fires by spontaneous combustion. The lamps should not be refilled when alight, and should be extinguished in a proper manner.

NOTE.—Special suggestions issued by the Public Control Department of the London County Council for securing safety in the use of lamps are given at the end of these precautions.

Spirits.—Methylated spirits, naphtha, petrol, benzoline or hair washes containing the same should be handled with great care, and no naked lights should be about. The receptacle for the spirit should be placed on an iron tray or base of fire-resisting material, away from curtains and other flimsy substances.

Celluloid and Flannelette.—Of the various articles in general household use, those which are manufactured of flannelette or celluloid are the most dangerous.

Electric Light.—Electric light installations to be safe should be well fitted, and periodically inspected by an electrical engineer. As regards circuits, the safest method to adopt for protection is to have them led in iron barrel and properly earthed. The dangerous points are switch-boards and cut-outs not properly mounted, short circuits, due to nails driven through the wires, and wet or other damage, also overloading by using too many lamps, &c.

Secondary Lighting.—In public buildings and large establishments current should be obtained from two separate sources or there should be available a good secondary means of lighting, such as gas or lamps.

Switch-boards. — Switch-boards and switches should not be placed in the vicinity of gas meters.

Replacing Lamps.—When lamps are changed, the current should be switched off.

Arc Lamps.—Where arc lamps are in use, pieces of carbon are likely to fall from same.

Temporary Circuits.—Temporary electric circuits are a great source of danger, and should be avoided.

Lightning.—Isolated buildings and houses with towers or flagstaffs of any considerable height should be provided with lightning conductors.

Gas Escapes.—Escapes of gas should not be sought for with a light. The place concerned should be thoroughly ventilated by opening all doors and windows. The main tap near the meter should be turned off. A gasfitter should be sent for, and the gas company communicated with immediately unless it is found to be a tap left on or some similar fault.

Gas not to be turned off at meter.—Gas should not be turned off at the meter unless absolutely necessary. There is considerable risk in doing so particularly where by-pass burners are in use. When gas has been turned off at a meter, on being turned on again, all burners should be lit and those not wanted turned off.

Meters.—Meters should be placed in a well-ventilated position. The gas key should be hung up near the meter in readiness to turn off gas from house in case of leakage or fire.

Piping.—Iron or brass piping is the safest, compo piping being easily damaged.

Chandeliers. — Sliding chandeliers which require water should not be used, as they are a fruitful source of accidents. Where used, they should be periodically filled with water, with a covering of oil, and a check fitted. They can be converted into fixtures, and thus made perfectly safe at a small cost.

Brackets.—Gas brackets should be rigid wherever possible, especially in bedrooms and where close to curtains. In stables, warehouses and similar places they should be protected by a stout wire guard, with a metal top, or a glass or metal protector fixed to the ceiling.

Swinging Brackets.—Where of necessity swinging gas brackets have to be be used, all precautions should be taken to limit their travel, so that the flame cannot come into contact with inflammable material.

Gas Ring Burners.—Boiling rings and similar burners supplied by flexible tubing should be placed on a base of slate, stone, iron or some other fire-resisting material. The tap should always be placed on the end of the tube opposite to the burner. Flexible tubing (if necessary) should be metallic, not india-rubber.

Precautions.—Suggestions for securing the safety in the use of gas are generally printed on the gas companies' index cards.

Cigar Ends.—Receptacles should be provided for cigar and cigarette ends and matches as their careless disposal is a source of danger.

Sun's Rays. — Highly inflammable materials should not be exposed to the sun's rays. Blinds afford sufficient protection.

Spontaneous Combustion. — Proper receptacles should be provided for the collection of dirt and rubbish. Greasy rags and oily waste, which ignite spontaneously, should be burned or kept in an iron receptacle separate from other rubbish.

Ashes and Cinders.—Hot ashes should be placed in some isolated position, or in an iron receptacle, clear of all inflammable material.

Staircases.—Staircases should be constructed of non-flammable materials. Great care should be exercised as to the storage in cupboards underneath them.

Lifts.—Lifts of all descriptions are dangerous as regards the spread of fire, and excepting open lifts in staircases should be enclosed in fire-resisting materials, such enclosure, where possible, to be taken to the top of the building, and lightly roofed. The doors should, as far as practicable, be kept closed.

Fire Separation.—Smoke and gases are the principal dangers to life, but these dangers may to some extent be guarded against by the provision on landings or in large corridors of hardwood doors, with glass panels, fireproof curtains or screens easily dropped. The provision of hardwood doors to rooms tends to retard the spread of fire.

Captain Hamilton's Preamble.

We publish below Capt. Hamilton's preface in full, as it gives certain information not generally known:—

"These hints and suggestions have been prepared in order that London householders may be made aware of the principal points to be remembered as regards (*a*) prevention of fire; (*b*) how to act in the event of fire; and (*c*) what to do in cases of injury by fire. They are the first to be officially issued, but are on similar lines to others having the same object in view, which have been prepared by private individuals. It must, however, be understood that in the case of very large, high and isolated houses where the local water supply and pressure is probably inadequate, and where some time would elapse before the attendance of the fire brigade, special provision as regards water supply and means of increasing the pressure by pumps, tanks or electric and hydraulic augmentors, may have to be adopted in connection with a general installation of small or large hydrants. Care should be taken that the pressure of water is always maintained, and if hydrants are external, means of drainage should be provided, to counteract the effect of frost. Where a full water supply is required, it should not be metered.

"Special circumstances arise in the case of churches, theatres, warehouses, factories, underground electric railways, woodyards, extensive business premises, or any buildings in which a large number of persons are employed or assemble at certain times, or in which large quantities of inflammable materials are stored. In such buildings the utility of sprinklers, drenchers, automatic fire-alarms, fire-resisting glass, iron shutters, the treatment of material with certain preparations and other methods to retard the progress of a fire, the provision of doors that open outwards, adequate means of escape, and the general structural condition and division of the buildings have to be considered. Fire-resisting doors, where fitted in dividing walls, should be so arranged as to be readily opened from either side by firemen.

"The cubical extent of buildings and constructional precautions in relation to the prevention of spread of fire, and the provision of means of escape from fire, are regulated under the London Building Acts, 1894 to 1905. Applications for the Council's approval under these Acts should be addressed to the Superintending Architect, London County Council.

"Fire-preventive installations and fire appliances generally, when once adopted, should be examined and tested at regular intervals to ensure that they shall be effective at the critical moment.

"It must be remembered that the reckless use of water is frequently responsible for as much damage as fire.

"A systematic inspection, especially the last thing at night, is one of the best precautions against fire. It is also advisable immediately after workmen leave a building, and in warehouses, large business premises and similar buildings directly after closing, and again a few hours afterwards.

"It cannot be too frequently pointed out that when a fire has obtained a firm hold on premises the indiscriminate forcing open of doors and windows by the public is most dangerous, unless means are available for immediately dealing with the fire or saving the inmates. The practice of forcing open windows and doors before the arrival of the fire brigade has been a frequent cause of loss of life.

"The cost of maintaining the London Fire Brigade being borne by the rates, no charge is made for the attendance at fires within the County of London, except in the case of chimney fires, when a penalty is imposed varying from 2s. 6d. to £1, according to the ratable value of the property. This is done with a view to minimising the nuisance from chimneys on fire, and to deter householders from neglecting to keep their chimneys well swept.

"When the London Fire Brigade attends fires outside the County of London a charge is usually made."

Lastly, we give some useful particulars as to the principal causes to which fires are attributable, as published in these hints. The number given is the average number during the last five years (1902-1906) taken from the annual reports of the Chief Officer of the London Fire Brigade.

Principal Causes to which Fires in London are Attributable.

Airing linen	64
Boiling over fat, oils, pitch, &c.	73
Burning rubbish	10
Candles	174
Children playing with fire	67
Children playing with matches	170
Electric circuits, defective	63
Fire, clothing coming into contact with	14
Flues, defective	120
Friction of machinery	10
Gas, escape of	130
Gaslight, curtains coming into contact with...	87
Gas, seeking for escape of, with a light	26
Gas bracket, swinging...	39
Gas stove	16
Hearths, defective	12
Hot ashes	88
Lights thrown down	619
Matches	20
Petrol, overflow of	15
Smoking tobacco	15
Spark from fire	225
Spark from locomotive	19
Spontaneous ignition	18
Stoves improperly set	65
Vapour of spirit coming into contact with flame	22

FIRE-RESISTING ROOFS TO THRUST-OUT SHOPS.

Questions are reaching us from various sources as to how it is that, after all the trouble and expense incurred by the London County Council in obtaining the very necessary enactment for the protection of buildings having projecting shops, so little should have yet been done in the matter of complying with the regulations.

One of the principal features of the new rules was that projecting shops were to have fire-resisting roofs, and that in the main they would be of concrete of a certain thickness. Concrete blocks made beforehand and dried are practically allowable, where it would be otherwise difficult to get the work done without hampering the business carried on in such shops.

Nevertheless, out of the many thousands of shops that must be classed as projecting shops and "thrust-out" shops, very few have as yet been taken in hand, and though the district surveyors of London have been busy scheduling shops (and, we assume, sending in their requirements to the London County Council), only a small number of these have been served as required by the Act.

Surely there must be some exceptional reason for the delay; as a matter of fact, it has been pointed out that possibly the architectural staff of the London County Council is not extensive enough to cope with the multifarious questions of the Amendment Act, and that pending a strengthening of the staff, or some other arrangement of the work, it will be impossible to carry out the measure.

We believe that powers exist for the whole of the work to be carried out under the supervision of the district surveyors should the Council so desire. The previous Council in its unfortunate efforts to centralise the work of the administration of the Act, and in its efforts to limit the usefulness of the district surveyors, took up more work than it could possibly handle. Would it not, then, be well to delegate—in the shortest possible form—the whole of the duties under the Act in respect to thrust-out shops to the district surveyors concerned, who also have the advantage of a practical knowledge of their localities? If this be done the Act will no doubt be carried out promptly without fear or favour.

THE FIRE-PREVENTIVE CLAUSES IN THE R.I.B.A. REPORT ON REINFORCED CONCRETE.

The third section of the report of the R.I.B.A. Committee on Reinforced Concrete (published in full in our issue for last week) deals with the question of fire-resistance, and we certainly consider that this part of the report tends to advance the subject of fire-protection in reinforced concrete buildings. We say "advance" advisedly, for we do not thereby mean to infer that the report provides for all that is necessary to obtain reinforced concrete structures that will not be seriously affected by fire. But there is a wide difference between this and the absolute neglect of the fire aspect which has been prevalent in many directions up to the present, and the following is the very useful advice given in the report in this special direction:—Clause A in the third section states that reinforced concrete prevents the spread of fire in varying degrees, according to the composition of the concrete, the thickness of the parts, and the amount of cover given to the metal. This, for all practical purposes, clearly indicates where precautions must be taken.

In Clause B it is pointed out that concrete in which limestone is used is disintegrated, and that concrete with gravel or sandstone suffers, the degree of injury being proportionate to the size of the aggregate, so that the smaller the aggregate the less the injury. This statement, also, for all practical purposes, is correct. The same clause goes on to say that concrete in which coke breeze, cinders or slag form the aggregate is only superficially injured, and that brick suffers more than cinder concrete and less than gravel or stone concrete. The selection of the word "cinder" is most unfortunate. It is a term not generally known in building practice in this country, although it is in common use in the United States. We can scarcely define what the committee mean by "cinder," and can only assume that those who drafted the clause meant *clinkers* as commonly supplied from dust destructors, but we may be wrong! There can be no doubt that from the fire point of view coke breeze and clinkers are the best aggregate to be used, but they have certain disadvantages, and the recent American practice of building beams and stanchions with a harder aggregate, and the protection of these beams and stanchions with a covering of coke breeze or clinker concrete certainly merits attention.

Clause C quite clearly intimates that the material to be selected should be governed both by the amount of fire-resistance required and the cost of procuring the material in question.

Clause D calls attention to the advantages of rigidity in the metallic members in reinforced concrete as far as the fire-resistance is concerned. Curiously, beams and floor slabs only are referred to, while columns and stanchions are not mentioned. Rigidity is certainly just as important for the fire-resistance of the vertical supports as for the horizontal ones.

In Clause E it is intimated that from experience of actual fires 1½ins. to 2ins. of concrete covering metal reinforcement appears to afford ample protection of structural parts. This statement is erroneous. As it happens, there have been few fires of importance in individual reinforced concrete buildings, and in those where there has been fire the temperatures attained were notably low ones. Only at Baltimore and San Francisco have there been serious conflagrations in which two or three reinforced concrete structures were affected, but the data obtained of these instances were unreliable, and the fact remains that the American Fire Underwriters, who looked into both cases, have recently finally determined that it will require much thicker protection than that indicated, whilst our own Fire Offices (who do American insurance business) also propose to change their rules in this particular—*i.e.*, in the direction of thicker covering for beams. For floor slabs, 1in. may, however, be sufficient. Here again on the question of covering the stanchion has been entirely omitted, whilst the most recent American practice, both in building laws and insurance rules, requires protection up to 4ins. for columns, stanchions, &c. We certainly hold that stanchions should have been mentioned in the report, and that something much thicker than 2ins. should have been indicated as the necessary protection for vertical supports.

We are pleased to note that the report advises rounded and splayed angles to prevent spalling off under heat.

Clause F deals with what may be termed the American practice of covering the soffits of reinforced concrete with a fire-resisting plaster, or with coke breeze concrete, as mentioned above, terra-cotta facings, and the like. We are glad the advantages of this form of protection have been pointed out, but we should have liked to have seen the word "porous" in front of "terra-cotta," as hard terra-cotta would scarcely afford the protection required.

Speaking generally, however, as indicated, the clauses dealing with fire protection are to be welcomed. They are a step in the right direction, and they only contain one error—that is, as to the experience obtained in actual fires as to the protection of the metal rods. Having regard to the very different views that were prevalent on this subject among the members of the committee, we think that both the chairman and the hon. secretary of the committee are to be congratulated upon having attained a workable compromise on the subject.

It is to be hoped the last has been seen of warehouses with floors in which the metal rods are protected by ¼-in. or ½-in. of concrete, and also that the last has been seen of the use of undesirable aggregates in buildings holding large stocks of inflammable material.

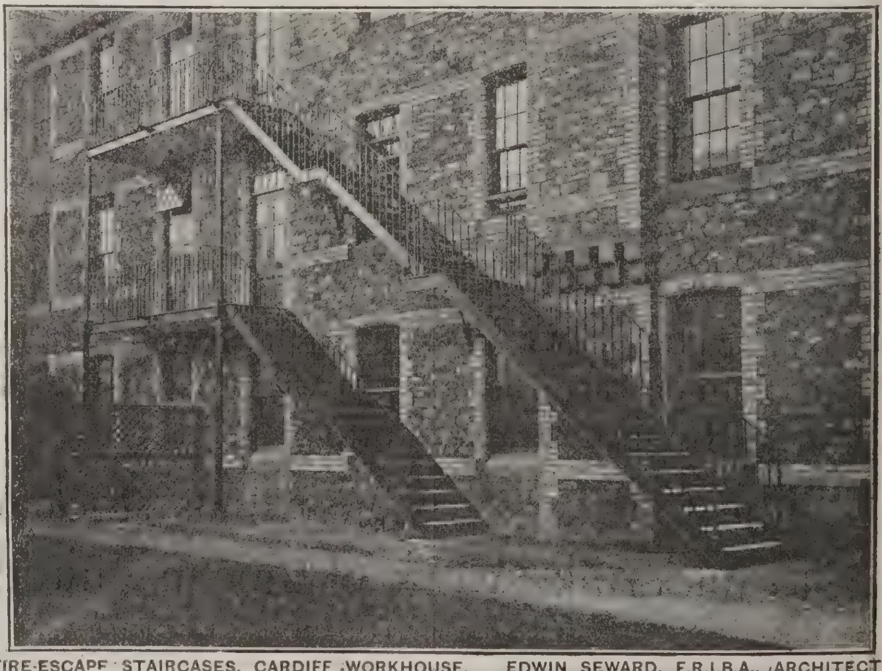
The report should tend to reduce the fire loss in buildings of the warehouse class, and the insurance companies may be relied upon to bring the necessary extra pressure to bear upon those who do not quite realise the necessity of fire protection of a higher degree for such property.

FIRE-ESCAPE STAIRCASES.

We illustrate on this page an iron fire-escape staircase which was erected recently at the Cardiff Workhouse by the St. Pancras Ironwork Co., of St. Pancras Road, N.W., to the order of Mr. E. Seward, F.R.I.B.A. The staircase shows a good type of light design, though it is not in conformity with London requirements—firstly, because the flights are constructed without any turns (so that they form practically one continuous flight), and, secondly, because the landings do not in all cases rest upon direct bearings, being supported in some cases by brackets from the walls: the London requirements are excessive in this respect, as at the time such a staircase would be required the flames would never have sufficient hold on the building to render the walls unable to support the weight of the staircase and the persons upon it. Long flights, of course, are not always advisable, but in a case such as this, where the greatest flight only comes from the second floor, there is no disadvantage.

A new Fire Station at Partick, Glasgow, has been erected at the corner of Clyde Street and Hozier Street. Besides the fire station proper, the buildings include a dwelling house for the firemaster and houses for the men.

A New Chief Fire Station for Birmingham.—The Watch Committee of the Birmingham Corporation have had under consideration for some time the provision of a new chief fire station for the city, but so far they have been unable to find a suitable central site at a price which they could recommend the Council to approve.



FIRE-ESCAPE STAIRCASES, CARDIFF WORKHOUSE. EDWIN SEWARD, F.R.I.B.A., ARCHITECT.

MEANS OF ESCAPE FROM FIRE.

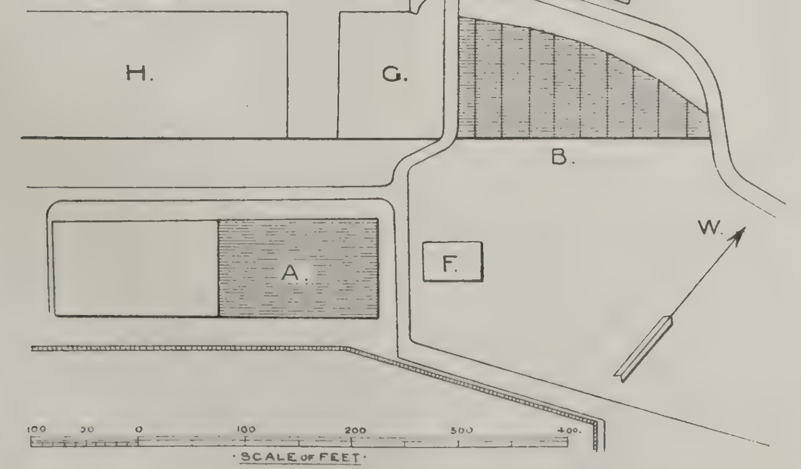
A Prosecution.

At Old Street Police Court on May 20th the London County Council prosecuted a Mr. Davis, of 28 and 29, Gun Street, Spitalfields, for "obstructing and rendering less commodious" a means of escape from fire in his factory. Mr. Chilvers, for the L.C.C., said this was only the second prosecution of the kind since the Act of 1905 came into operation, and was of great importance to all persons coming under the Act as to factories and workshops and the Acts relating to the means of escape in case of fire. The defendant employed about 30 hands on the premises in question, and a fire occurred there on April 4th. The first floor was involved, and girls and men working there and above were unable to escape by the staircase to the ground floor. On going up to escape to the roof it was found that the door at the head of the stairs, which, according to the Act, should be always kept for ready opening, was padlocked. Amid great excitement and after much delay in getting irons to batter down the door, 15 men and girls effected an escape to the roof, whence they had to be brought down by the firemen.—Defendant said he had only entered into business occupation of the premises on April 1st, and had not had time to go over the place and see what was wrong; he had never been up the stairs and knew nothing of the locked door.—A fine of £5 (one-fourth of the full penalty) was imposed, with two guineas costs.

A COTTON FIRE AT BREMEN.

The city of Bremen has again been the scene of a serious cotton fire. The fire comprised a shed with 7,000 bales of cotton, a second shed with 9,000, and a third with 1,800 bales, a considerable store of wheat, and part of the Customs depôt. The plan of the fire is eminently instructive, and we reproduce a drawing of it. The fire broke out in the building marked A, spread to the building marked B, and finally reached the buildings marked C. The direction of the wind is indicated. The nearest fire-station was a sub-station of the Municipal Fire Brigade in the building E. The fire occurred at the height of a gale, and the object-lesson it furnished was, that regardless of the fact of an extremely well-managed fire-brigade being in the closest proximity to the scene of the conflagration, meteorological conditions utterly upset the whole fire-preventive system, and the result was a very serious disaster, despite the fact that 6 steamers, 2 chemical engines, 10 hydrants from the high-pressure system and two floats, almost the whole brigade and 180 civilian helpers were in attendance.

The fire is one which harbour and dockyard authorities would do well to consider when calculating on the possible spread of fire across narrow waterways, open spaces up to 100ft., &c. for lightly constructed buildings of a highly inflammable character such as cotton and jute sheds.



PLAN OF COTTON MILL FIRE AT BREMEN.

ELECTRIC FIRES.

At the enquiry held by Dr. F. J. Waldo, the City Coroner, regarding a fire which occurred on April 13th at a jeweller's shop at 63, St. Paul's Churchyard, one of the witnesses stated that the head of an electric glow lamp near celluloid might cause combustion. From his evidence, in fact, the conclusion would be drawn that if a dangerous combustible like celluloid burst into flame through being left in contact with a warm lamp bulb the fire, according to the Fire Brigade's book of definitions, would be an "electric" fire.

The number of fires which could be properly called "electric" fires is not large, but so long as people continue to use air-tight show-cases filled with various celluloid articles, or dynamite, &c., and hang electric lamps beside such articles, explosions are almost bound to occur. Electric lamps are so safe that consumers take liberties with them. If only a little more care were exercised in the matter "electric" fires would be still less frequent than they are at present.

MOTOR GARAGES AND FIRE PROTECTION.

We observe that the National Fire Protection Association of America has provided a series of rules in respect of the construction and equipment of motor garages which it would be well to study, having regard to the rapidly-increasing hazards of motor-car storage in the Metropolis.

The rules, which we publish below, are most comprehensive; indeed, they err perhaps a little in extreme detail, but seeing that they are to be applied by the insurance companies of America, who have to bear the risk of the all too frequent fires in buildings of this class, it is not to be wondered that attention has been paid even to trivialities.

One point in the rules to which we would particularly refer is the definition of what a garage is, and another is the necessity of there being no stoves, forges, &c., actually in a garage.

Definitions.

Section 1.

A "garage" is—

- (*a*) A building or that portion of a building in which vehicles equipped for using or carrying volatile inflammable liquid for fuel or power are kept, whether said vehicles are kept for use, for sale, for rental, for exhibition, or for demonstrating purposes, and—
- (*b*) All that portion of a building that is on or below the floor or floors on which an automobile carrying a volatile inflammable liquid is kept, and is not separated therefrom by approved and unpierced fire-walls and floors.

Section 2.

A "volatile inflammable liquid" is any liquid that will emit an inflammable vapour at a tempera ture below 100 degs. Fahr. when tested in—

- (*a*) The open air, or—
- (*b*) The closed pyrometer of Guiseppe Tagliabue.

1. An "automobile" is any self-propelling vehicle.

The Building: its Position and Size.

Section 3.

An automobile carying a volatile inflammable liquid shall not be placed in a building—

1. If built of wood shall be not more than 15ft. high.
   - (*a*) Shall have a capacity for not more than four vehicles.
   - (*b*) Must be located at least 20ft. from any other building.
2. Must not be located in a building in which any part is occupied as a dwelling, an hospital, a theatre, a church, a school, or as a boarding, lodging or tenement house—the only exception to this provision is that a private garage may be located in a building occupied in part as a dwelling by the family of an owner, a lessee, or an employee;
   - (*a*) Where at any one time more than ten people congregate in a portion of the building that is outside of the garage and is not separated therefrom by unpierced approved fire-walls and floors;
   - (*b*) Where all sewer connections from washstands and sinks are not provided with an approved oil trap with a glass gauge pipe and a draw-off cock, in a readily accessible place and where not liable to injury.

Fire-Resisting Construction.

Section 4.

Must be of approved fireproof construction—

- (*a*) If intended for storage of more than four vehicles;
- (*b*) If built within 20ft. of any other building;
- (*c*) If other portions of the building are to be used as a dwelling, an hospital, a theatre, a church, a school, a boarding, tenement or lodging house, a store or manufactory, where more than ten persons are employed, and in all such cases the floors, ceilings and walls must be unpierced, except that there may be windows fitted with approved metal frames and sash glazed with wired glass in walls opening on a street, public highway, or space separating it at least 5ft. from any other building.

Storage.

Section 5.

Closets for storing volatile inflammable liquid in safety cans shall, where possible, be outside the main building, and shall—

1. Not be larger than required for the purpose;
2. Be lined inside and covered outside with sheet tin applied with lock joints and blind nailed;
3. Be ventilated to the outer air;
4. Be in an unexposed location.

Tanks.

Section 6.

Storage tanks shall—

1. Not be installed until application with plans and specifications showing full details of location and construction of tank and all connections has been approved by underwriters having jurisdiction.
2. Not be placed—
   (*a*) Under a sidewalk or in a sidewalk area unless it shall be shown to the satisfaction of underwriters having jurisdiction that it would not be hazardous, and that there are physical conditions that make it impracticable to instal it elsewhere; nor—
   (*b*) Inside any building that is more than one storey high, or that has a cellar or a basement, unless safeguarded as hereafter specified in *Section 14*, and satisfactory to underwriters having jurisdiction.
3. Not have a capacity in excess of 275 gallons:
4. Be made of iron or steel at least $\frac{3}{8}$in. thick:
5. Be coated on the outside with tar or other rust-resisting material;
6. Have all joints tightly caulked;
7. Be tested by hydrostatic pressure, 100lbs. to the sq. in.;
8. Have all pipe connections at the top;
9. Be buried entirely, so that no part of the tank is less than 2ft. under the surface of the ground, and in addition to being 2ft. under ground—
   (*a*) Tanks that are to be filled by a pipe from the street shall be buried at least 2ft. lower than the grade of the street;
   (*b*) Tanks in the ground that are within 10ft. of any building shall, if practicable, be buried 2ft. lower than the level of the lowest cellar floor in any such building;
10. Be embedded in 12ins. of Portland cement concrete well tamped in place, and—
    (*a*) Should there be more than one tank, they shall be separated by at least 12ins. of such concrete, and—
    (*b*) Should an underground tank be within 10ft. of the building and not be buried at least 2ft. lower than the level of the lowest cellar floor of such building, it shall be embedded and surrounded by Portland cement concrete 12ins. thick to top of tank;
11. Be provided with a filling pipe, a vent pipe, and (if not more than 30ft. from all buildings) a drawing-off pipe;
12. Be provided with an approved pump or with an approved pressure apparatus for drawing off contents;
13. Not to be placed so that the top of tank shall be below the drawing-off point;
14. May be placed in vault below first floor of building, provided—
    (*a*) That there is no opening into room where automobile is housed.
    (*b*) That it is built entirely of masonry concrete, brick or stone on all sides and top and bottom.
    (*c*) That it has two self-closing lock-joint proved fireproof doors.

The Vent Pipe.

Section 7.

The vent pipe shall be—

1. Made of 1in. or larger wrought-iron pipe, with—
   (*a*) Heavy cast-iron fittings;
   (*b*) Screw joints made with litharge and glycerine;
2. Connected with top of storage tank;
3. Provided with a screen of 30-mesh brass wire at or near the tank connection;
4. Carried up to the outer air, be well braced in position, and—
   (*a*) Either capped with a double goose neck with openings—
      (1) At least 10ft. higher than roof of garage,
      (2) More than 20ft. from all windows in higher adjacent buildings, and—
      (3) Covered with a brass wire screen of $\frac{1}{16}$in. mesh;
   (*b*) Or closed by a shut-off cock so arranged that the filling pipe cannot be opened without opening the vent, and the opening to the shut-off cock shall be—
      (1) Directly over storage tank,
      (2) More than 30ft. from all buildings,
      (3) Covered by a screen of 30-mesh brass wire,
      (4) Closed by a screw cap when not in use, and—
      (5) Enclosed in a metal box, with a cover that is flush with the surface of the ground and is kept locked when not in use.

The Filling Pipe.

Section 8.

The filling pipe shall be—

1. Made of 2-in. or larger wrought-iron pipe, with—
   (*a*) Heavy cast-iron fittings, and—
   (*b*) Screw joints made with litharge and glycerine;
2. Provided with screens of 30-mesh brass wire,
   (*a*) One at or near the tank connection, and—
   (*b*) One just below the filling cock or valve;
3. Closed at the intake by a filling cock or valve, the opening of which shall be closed by a screw cap when not in use;
4. Connected with top (or with valve connecting therewith) and extend down to the bottom of the storage tank;
5. Laid at a uniform grade so that it will drain empty in the tank;
6. Carried up and terminate with the intake and filling cock or valve in—
   (*a*) The pump house, or—
   (*b*) A metal box, with a cover that is flush with the surface of the ground, is kept locked when not in use, and is more than 30ft. from all buildings; or—
7. Carried up and out of the building and terminate in a covered box of heavy iron sunken at the curb flush with the sidewalk, kept locked when not in use, and in this case the shut-off valve shall be provided with a coupling for attaching the hose of a barrel-wagon, and shall only be used for receiving volatile inflammable liquid from barrel-wagons.

Pumps and Pump Houses.

Section 9.

Pumps for delivering volatile inflammable liquid shall—

1. If within 30ft. of any building, be located in a fireproof pump house;
   Have a shut-off valve, with ground key, on the nozzle;
3. Have a check valve between pump and nozzle;
4. Have screw stuffing box for pump rod;
5. Have stuffing box for pump rod higher than outlet of pump.

Section 10.

No pump or pump house, unless built as hereafter specified, shall be placed—

1. In a building more than one storey high;
2. In a building that has a cellar or basement;
3. In the cellar or the basement of any building;
4. In an area between a building and a sidewalk;
5. Under a sidewalk; or—
6. Within the stoop line.

Section 11.

The pump house shall have—

1. No greater capacity than required for—
   (*a*) Handling the volatile inflammable liquid, and—
   (*b*) Storing the safety cans;
2. A cement floor at least 6ins. lower than the door sill, and not more than 12ins. below the grade of the ground where located;
3. Heavy galvanized-iron drip pans—
   (*a*) One to cover entire floor of pump house,
   (*b*) One to be kept under nozzle of pump, and—
4. May be built of metal,
   (*a*) Ventilated by four metal covered openings 12ins. by 12ins., two at the floor and two at the roof on opposite sides of the building.
5. If within 30ft. of a building or located in a building must be built with—
   (*a*) Brick walls at least 12ins. thick laid in cement mortar or reinforced concrete 7ins. thick;
   (*b*) A brick or reinforced concrete roof at least 8ins. thick covered with plaster of Paris not less than 2ins. thick;
   (*c*) Either—
      (1) An approved brick ventilating flue, or—
      (2) An approved galvanised-iron ventilating pipe;
   (*d*) No opening through the walls or roof except when protected by a pair of self-closing Standard fire doors, with lock joint and with space of 1ft. between same.

Section 12.

A brick ventilating flue shall be used where the pump house is located inside another building and shall—

1. Be built in the wall opposite the door;
2. Be lined with tile pipe, 8ins. by 8ins. inside measure;
3. Extend from the floor up to and through roof of the pump house to at least 4ft. higher than roof of the garage;
4. Be capped with an 8-in. or larger 18-gauge galvanized-iron double goose neck, with openings remote at least 10ft. from windows of higher adjacent buildings;
5. Have an opening—
   (*a*) At the floor, 6ins. by 8ins.,
   (*b*) At the ceiling, at least 4ins. by 6ins.,
   (*c*) At each end of the double goose neck the full size of the pipe; and—

   Have all openings protected by wire brass screens not coarser than $\frac{1}{8}$-in. mesh.

Section 13.

A ventilating pipe shall—

1. Be made of galvanised iron of not less than 18 gauge;
2. Be not less than 8ins. diameter;
3. Extend from 3ins. above the floor up to and through the roof of pump house to 4ft. higher than roof of garage;
4. Be capped by a $\frac{1}{8}$-in. or larger 18-gauge, galvanized iron double goose neck with openings remote at least 10ft. from windows of higher adjacent buildings;
5. Have an opening—
   (*a*) 3ins. above the floor, the full size of the pipe,
   (*b*) At the ceiling, at least 4ins. by 6ins.,
   (*c*) At each end of the double goose neck, the full size of the pipe; and—
6. Have all openings protected by wire brass screens not coarser than $\frac{1}{8}$-in. mesh.

Pressure Systems.

Section 14.

Pressure systems for delivering volatile inflammable liquid from storage tanks shall—

1. Be so arranged that the gasoline will return through pipes by gravity to the storage tank when system is drained;
   (*a*) Should be an approved system.
2. Be connected in a manner that will prevent the spilling of the volatile inflammable liquid, to a drawing-off cock or cocks situate—
   (*a*) At a permanent filling station, or—
   (*b*) In a pump house.

Filling Stations.

Section 15.

Filling stations shall be located at least 20ft. distant from the entrance to the garage, shall have a tight, unpierced cement or other approved fireproof floor, graded to a centre, and unconnected with the sewer or drainage system of the building. The floor shall be kept free from volatile inflammable liquid by sponging or swabbing. The roof shall be kept free of inflammable vapours, either by natural or by forced ventilation.

Stoves, Boilers, &c.

Section 16.

No stove, forge, torch, boiler or other furnace, flame, fire, or fire heat, no electric dynamo, motor, hoist, or other exterior sparking electric appliance, and no artificial light (except the incandescent electric light) shall be used or allowed—

1. In a garage, or—
2. In any portion of the building on or below the topmost floor of the garage that is not—
   (*a*) Provided with an entrance on the outside of the building, and—
   (*b*) Separated from the garage by unpierced, approved fire walls and floors.

Section 17.

No garage shall contain more than—

(*a*) 10 gallons of volatile inflammable liquid in approved safety cans,
(*b*) 1,375 gallons (25 barrels) of volatile inflammable liquid in underground storage tanks,
(*c*) 120lbs. of calcium carbide in air-tight containers.

Section 18.

Approved safety cans for storing volatile inflammable liquid in a garage shall be made of metal, shall be self-closing, and of a capacity of 5 gallons or less, and when not in use shall sit in drip pans, either in the pump house or in an approved closet.

Section 19.

All fire and lights on an automobile, or under the boiler of an automobile, shall be extinguished before bringing the same into a garage, and shall not be lit while the same is in the garage.

Section 20.

Movable incandescent electric lights in a garage shall be protected by approved metal cages, and shall be fitted with keyless sockets; all electric switches and plugs shall be permanently located at least 4ft. above the floor.

(*a*) Electric charging apparatus shall not be installed in a garage equipped for handling volatile inflammable liquid until plans and method of installation are submitted to and are approved by the underwriters or municipal authorities having jurisdiction.

Section 21.

Smoking to be absolutely prohibited in any room or place in which a volatile inflammable liquid is kept, or in any room or hall opening into such room or place. A notice in large letters—"NO SMOKING"—shall be displayed in a conspicuous place and manner on all floors and at all entrances to the garage, and in all rooms and halls opening into the room or place in which a volatile inflammable liquid is kept or in which an automobile carrying a volatile inflammable liquid is kept.

Section 22.

No volatile inflammable liquid shall be—

1. Used in a garage for cleaning or for any other purpose whatsoever other than filling the tanks of automobiles;
2. Allowed to run upon the floor or to fall or pass into the drainage system of the garage;
3. Put into or removed from the tank of an automobile while any light or fire on the same is burning;
4. Carried or kept in open vessels.
5. All volatile inflammable liquids and oils recovered from the oil traps, or by swabbing or sponging up spilled liquid shall be placed in an approved safety can of not over 5 gallons capacity. And all quantities in excess of 5 gallons shall be returned to the underground storage tank or removed from the premises forthwith.

Section 23.

Sand shall be kept—

1. In approved boxes provided with hand scoops, or fire buckets, for fire-extinguishing purposes only;
2. In convenient receptacles for use in absorbing waste oil on floors;
3. In bed or metal drip pans under each automobile kept on floors that are not fireproof.

Section 24.

Self-closing metal cans set firmly on 4-in. legs shall be kept on all floors for the purpose of holding all inflammable waste material.

Section 25.

Calcium carbide shall be kept in air-tight metal packages, which packages shall be kept at least 6ins. above the floor in a water-tight container provided with a securely fastened cover.

Section 26.

Nothing in these requirements is intended to conflict with any present National Fire Protection Association standards.

(*a*) All approved devices are understood to mean approved as of N. F. P. A. standard.

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MODERN PLUMBING.—II.

We now come to fittings which discharge waste water.

Sinks

are made in many varieties. Special kinds have wells which enable plates and dishes to be washed therein without the whole surface being flooded. The higher surface of the sink serves as a drainer. The "Krator" and "Helios" sinks here illustrated belong to this category. These two varieties are made by Messrs. W. C. Gibson & Co., Ltd., and Messrs. Adamsez, Ltd., of Scotswood-on-Tyne. Then there is the slop sink, often provided with a wood rim to prevent damage to utensils emptied therein. Slop sinks for hospital use become more complicated. Fig. 15 (Messrs. Davis & Bennett's pattern) shows a combined scalding and slop sink with combined enamelled flush pipe, gun-metal self-closing valves, ascending jets, scalding sink fitting with combined standing waste and overflow and hot and cold valves. Fig. 14 also shows a hospital sink (Messrs. Morrison, Ingram & Co.'s pattern). Other special sinks are required in laboratories, these, as a rule, being lead-lined, with a deep well. It is important to observe in the fitting up of these that room is provided between the tap and the sink to allow large glass vessels to be placed under. Butler's sinks are also often lead-lined, the object being to avoid damage to breakable vessels. A comparatively recent innovation is the fixed wash tub. This is very often made in cast-iron, enamelled. These seem to have become widely known, firstly, in connection with public baths and washhouses, but they are now being fitted into mansions.

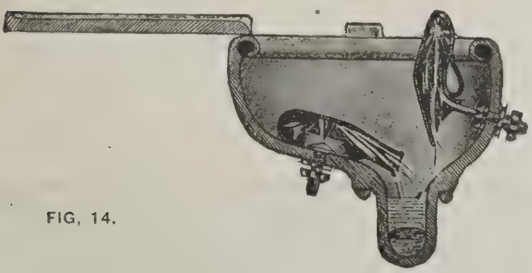


FIG. 14.

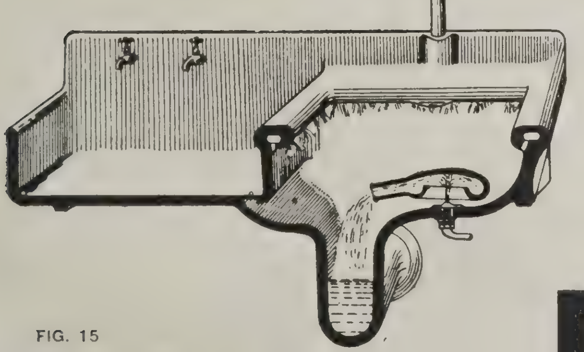


FIG. 15

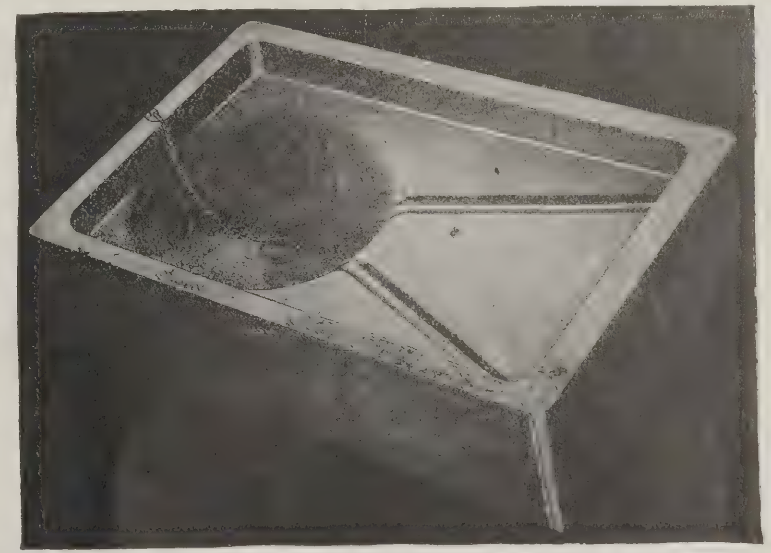


FIG. 12. THE "KRATOR" SINK.

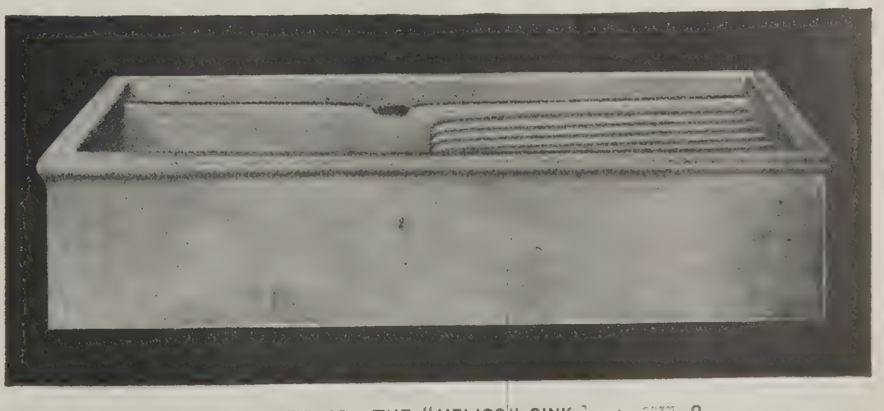


FIG. 13 THE "HELIOS" SINK.

As regards lavatories,

here, again, the patterns are innumerable. The fittings in connection therewith, of course, more particularly concern a plumber. Some of the water companies require that if the overflow from the lavatories has not a separate waste pipe, but returns into the same trap as the waste, they shall be fitted with self-closing spring valves, so that the water cannot be left running and result in waste. The precaution is rather excessive, but it has resulted in these fittings being often found with lavatories where the provision of a separate waste from the overflow is not desired.

Water is either discharged from a lavatory by tipping up the bowl or by removing a plug. The plug may be a tube, the open top serving as a waste (this tube sometimes being concealed below the top of the lavatory behind the overflow grating) or the plug may be a stopper either attached by a chain so that it can be pulled out of the hole, or kept approximately in its position by a bolt fastened to a grating in the outlet. The plug, too, may be concealed from view.

Lavatories are now made supported either upon brackets or corbeled out from the wall. The pedestal lavatory standing from the wall is a recent introduction and, as a rule, forms a more handsome fitting. Other forms, too, stand upon legs like a table. For school purposes and public places lavatories may consist of a long trough in which a number of persons may wash, or a somewhat similar arrangement may be adopted with a series of separate basins in one range.

The large-size lavatory basin seems to be favoured by most persons so as to give plenty of room and enable the face to washed or the head to be shampooed. Fig. 16 shows a lavatory made by the Leeds Fireclay Co., Ltd., which has a special spray that sweeps the whole surface, and so keeps it clean from dirt, soap suds and scum. Hospital lavatories generally allow the water to be turned off and on without using contaminated hands, by providing that the taps can be operated by the elbow, knee or foot of the user. Such a lavatory was shown in Fig. 6 in our previous "Contractors' Supplement." Fig. 17 shows a section of a hospital lavatory of novel construction, where the trap is made of glazed ware all in one piece with the basin. This is an excellent idea. It is made by Messrs. G. & D. Musgrave, Ltd.

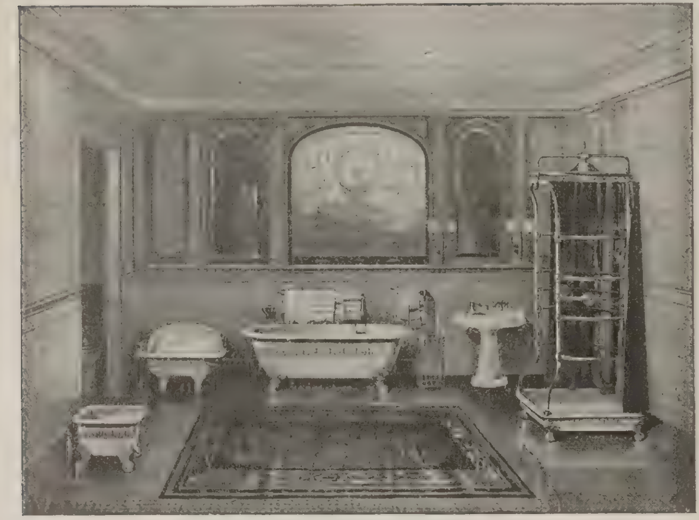


FIG. 18. A MODERN BATHROOM.

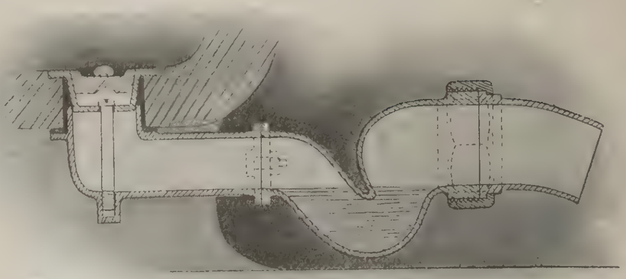


FIG. 19.

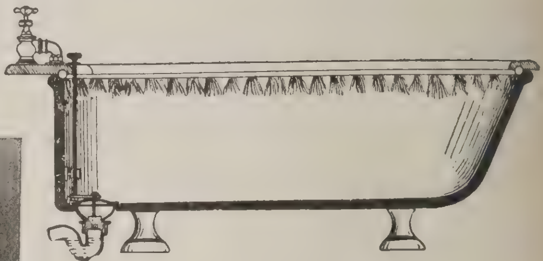


FIG. 21.

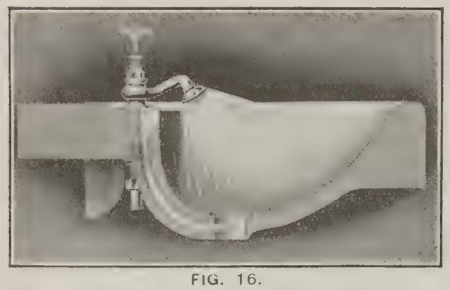


FIG. 16.

As regards baths,

these again are of many forms. There is the full-size bath standing on feet or upon the floor, and, indeed, sunk in the floor partially or wholly. There is the smaller sitz-bath, the foot-bath and the shower-bath. The disposition now is to regard the bathroom as a very important compartment in a house, and bathrooms are becoming larger and much more elaborately fitted up. We give a view, Fig. 18, of a typical bathroom of the latest type, this being designed by the Standard Sanitary Manufacturing Co., who are noted for their cast-iron and sanitary goods, enamelled with a remarkably fine finish and great resistance (being even undamaged by the blow of a hammer). Fig. 20 shows a range of foot- and shower-baths suitable for public baths or schools, made by Mr. W. E. Farrer. The ordinary shower-bath is shown in Fig. 18.

Fig. 19 shows a combined bath waste and trap of original construction, made by Mr. John Jones, of Chelsea, S.W.

Fig. 21 shows a design by Messrs. Davis & Bennett for a hospital bath with a flushing rim.

Water-closets and their Fittings

There are three main types of water-closet available—namely, the valve closet, the wash-down or wash-out closet, and the syphonic action closet. In addition to these three is the trough closet, consisting of a range of closets, often used in schools, factories, and public conveniences, but inapplicable to private use.

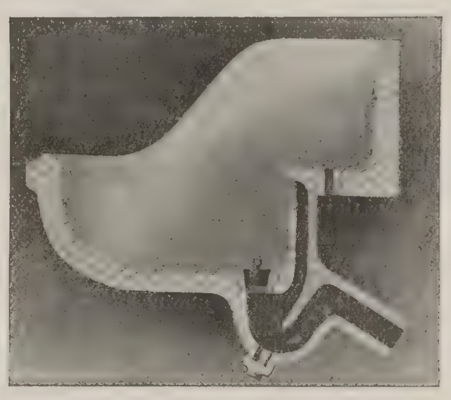


FIG. 17.

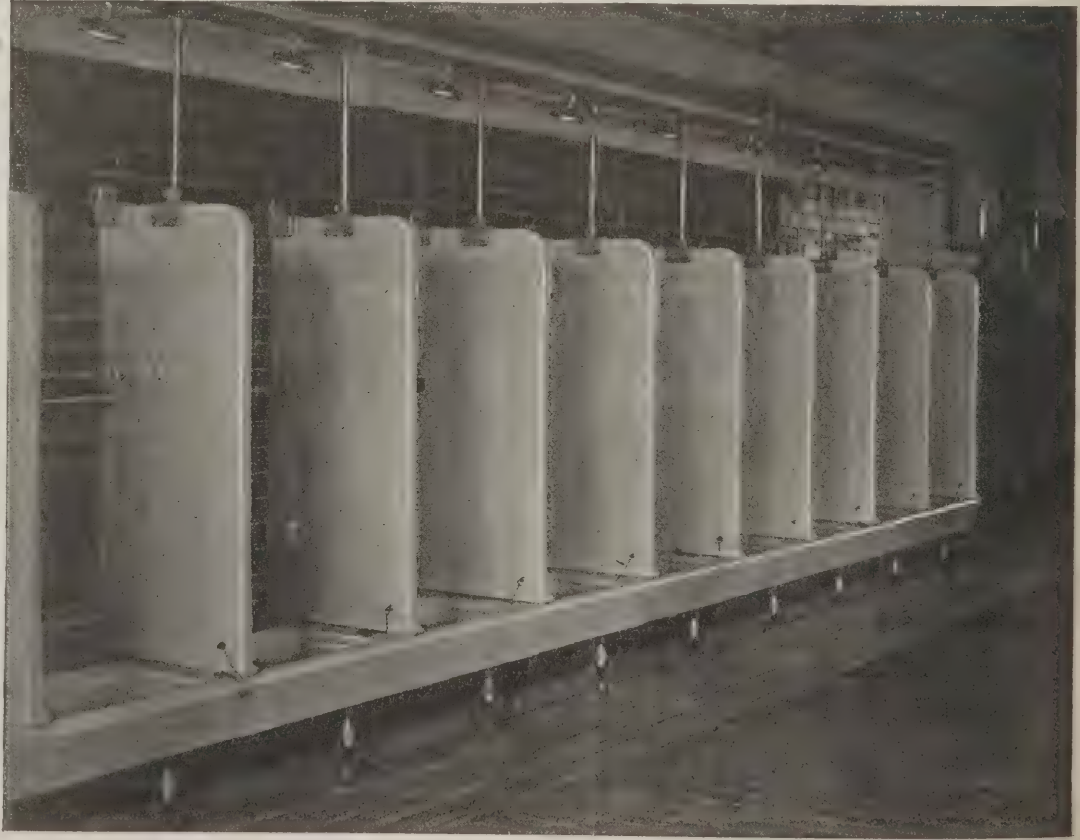
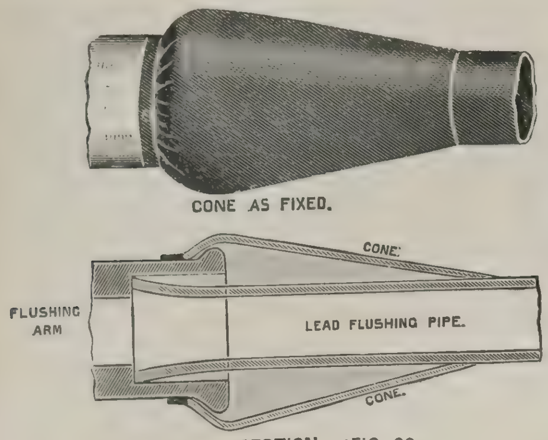


FIG. 20.

The valve closet is preferred by some persons because it generally creates less noise when flushed, has a larger water area than the wash-down, and because of its double seal, but the complication of the fittings has led to a loss of favour. The valve closet consists of a basin, a valve-box and a trap, one below the other. As regards the fittings there is the water supply pipe, with water regulator, overflow from basin, the flap valve, and levers for operating. When dealing with water waste preventers, further reference will be made to this.

The wash-down is the most favoured variety of water-closet. The wash-out is a form used in the United States, but not favoured here; it has a sinking in the pan which retains a small amount of water. This is washed out by the flush each time, and easily removes the fæces.

There are naturally many small differences in detail in various makers' wash-



SECTION. FIG. 22.

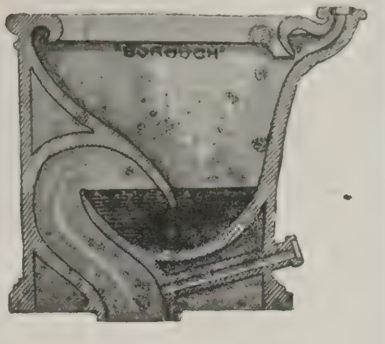


FIG. 23.

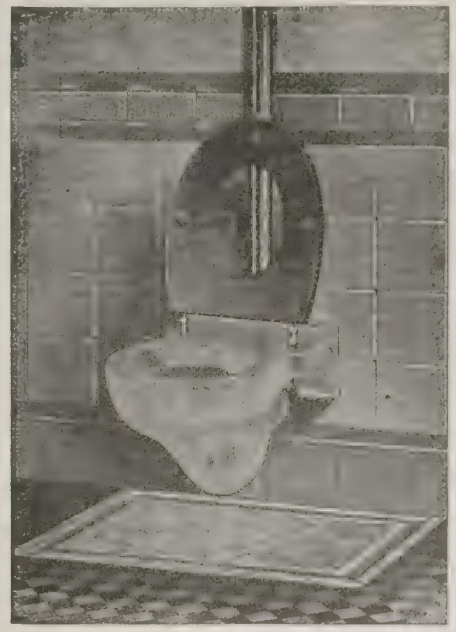


FIG. 25.

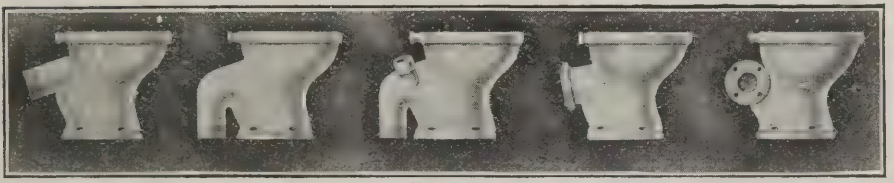


FIG. 24.

down closets, but the chief essentials, according to Mr. Hellyer, are that they should contain sufficient water in the pan to entirely submerge the fæces, should have no place where fæcal matters can accumulate or to which they can cling, should have a 1½in. water seal, and should be so constructed that its contents may be changed and parts well cleaned by a flush of two gallons. Wash-down closets are made with trap and pan in one piece or two, the separate trap, of course, allowing the pan to be removed or repaired without interfering with the drain.

Doulton's "Simplicitas" is a well-known wash-down closet, which is thus made in two pieces. This is well designed. It has a vertical connection for the flushing pipe similar to that in Fig. 23; this obviates the use of a rubber cone, or rag and string joint, both of which are unsatisfactory and insanitary. Messrs. Broad & Co., Ltd., supply a fitting for connecting the flushing pipe, which also affords means of overcoming this difficulty in a really satisfactory manner. Fig. 22 shows the arrangement of their patent "Hygienic" cone. It will be seen from this that the cone has a thick metal body with a thin end which is easily closed by the fingers over the bead of the flushing arm; it is easily fixed, and being smooth is readily kept clean. Neither wire nor a solder joint is required. The makers' directions for fixing are that the inside of the cone and end of supply pipe should be first painted; the joint made with soft putty as shown in the section; the thin end of the cone then carefully pressed round the arm of basin, and the surplus putty removed.

Fig. 23 shows a wash-down closet by Messrs. Sessions & Sons, Ltd., of Gloucester, in which the trap is in one piece with the pan; the earthenware anti-syphonage pipe should be here noticed.

Closets can be obtained with the outlet arm at any angle. Fig. 24 shows several varieties stocked by the Leeds Fireclay Co., Ltd.

The pedestal form undoubtedly allows dirt to collect round the closet, and for hospital use bracket or corbel closets are often preferred. Fig. 25 shows a variety of corbel closet by Messrs. Mellowes & Co., Ltd.

The syphonic-action closet is more recent than the wash-down. Fig. 26 is the pattern made by Messrs. George Jennings, Ltd., and clearly shows the action of such syphonic discharges. The removal of the contents of the basin is assisted by the syphon, while two seals are obtained as there are virtually two traps. The flush is assisted by the jet discharging in the long arm of the syphon, in addition to that round the rim of the pan. The syphon leg is ventilated by two pipes leading to the open air, so that a continuous circulation of air prevents any possibility of the escape or accumulation of foul air. These vent pipes also obviate syphonage of the basin by the emptying of slops.

With regard to water waste preventers, there are a large number of different forms on the market. As regards the ordinary valve closet, Fig. 27 gives a view of a water-waste preventer supplied by the Lambeth Brass & Iron Co., Ltd. This gives a flush and an after-flush, and is noiseless in its action. The manufacturers advocate its adoption for superseding the ordinary flushing cistern, which is certainly unsightly and noisy.

As regards the ordinary flushing-cistern type, the water is either discharged direct by gravitation or by means of a syphon, the action of the latter being started by the pulling-down of the lever. The syphon discharge is the more common, and there are many variations as regards detail. The syphon is either started by opening a valve which lets the water into the down pipe or a volume of water is propelled by a plunger over a bend into the down pipe. In the latter variety the plunger may work vertically or horizontally, and its action may take place in a separate junction or in the syphonage end of the down-pipe itself. Of course the flush of the water down the pipe tends to cause a vacuum, which starts the syphon. Fig. 28, the Lambeth Brass & Iron Co.'s pattern, is of the latter plunger variety, the water being forced over the syphon bend itself. A similar action is found in Pontifex's patent "Nosound" water-waste preventer, made by Messrs. the Farringdon Works and H. Pontifex and

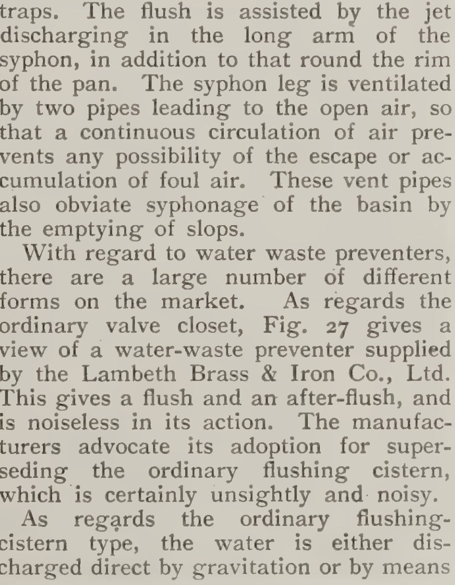


FIG. 26.

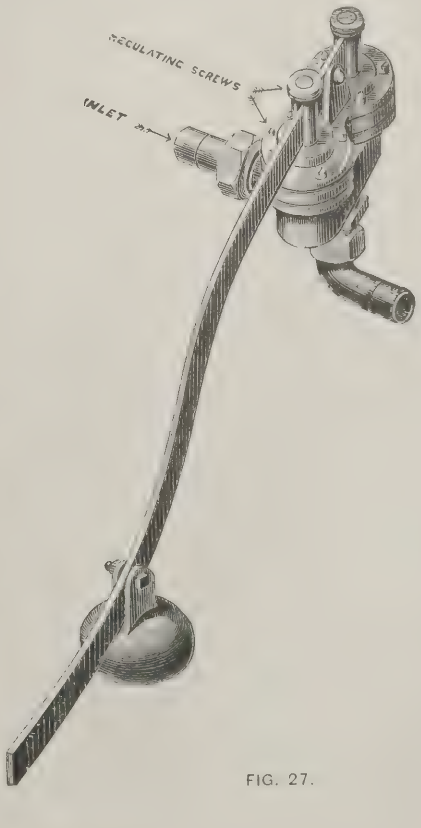


FIG. 27.

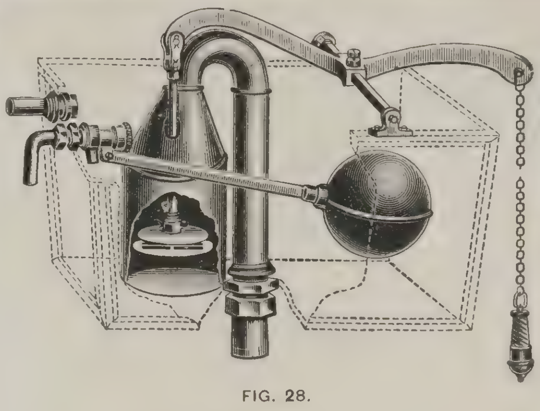


FIG. 28.

FIG. 30.

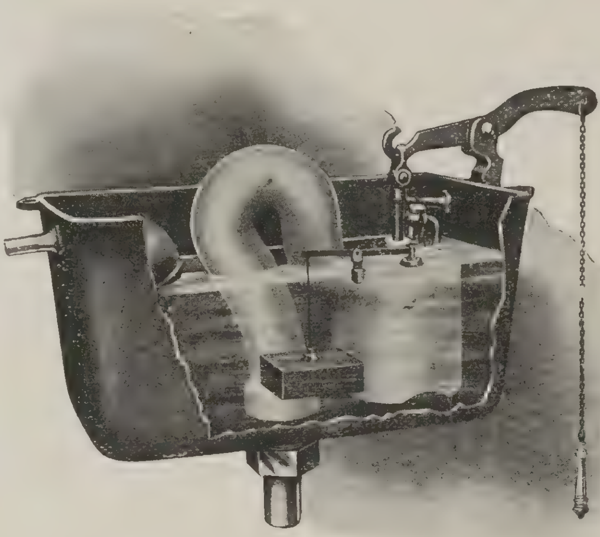


FIG. 29.

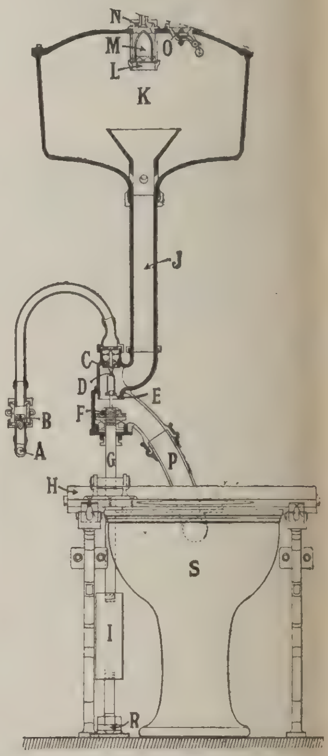


FIG. 31.

Sons, Ltd., and shown in Fig. 29. The reduction of noise is effected in the latter by means of the copper float and valve in the plunger-box. At the end of a discharge the float falls and opens a full bore air valve, thereby allowing the air to fill the vacuum, thus obviating the gurgling noise heard when the water rushes under the rim in the plunger-box.

Regarding the cistern itself in which the mechanism is contained, usually this is of cast-iron in London, although in certain districts the lead-lined wooden cistern is preferred, but undoubtedly a superior form is that made of glazed ware, such as that by Mr. W. E. Farrer, shown in Fig. 30.

Automatic flushing cisterns are useful in public conveniences, schools, or factories.

The usual means of starting the flush is by pulling down the chain, but Messrs. Adamsez, Ltd., recently introduced a push button which operates pneumatically.

Grundy's patent water closet, "The Only," is a new departure, being very different in many respects to the ordinary closet. The resulting combination is unique and sufficiently important to warrant detailed consideration. Fig. 31 shows the construction. When the seat (H) or the foot lever (R) is pressed down the main spindle (G) is raised, thereby first closing the outlet passage of the two-way valve (E) by the stopper (F); the spindle (G) continuing in its course next engages the spindle (D) through and by which the inlet valve (C) is opened. In this way leakage is prevented, the outflow being closed before the inlet is moved and *vice versa.* The inlet valve thus being opened water flows in up the pipe (J) to the cistern (K), in which it rises until it reaches the air-passage (L), through which air has been escaping. The rising water lifts a cone-shaped float-valve (M) until the nose of the float rests in its seating and closes the the cistern. The water, however, does not then stop, but continues to enter until the pressure in the cistern is equal to that of the supply, upon which the check valve (B) falls to its seat, preventing return. In no other system, either in letter or spirit, are the conditions as laid down by Sect. 23, c. 84 and 85, &c., complied with. The pressure thus obtained in the cistern, assisted by the compressed air cushion on the top of the water, gives a perfect flush, dispensing with the need for a high fall, and the cistern therefore always stands empty, and is placed down close to the closet. The top of the cistern never need be more than 3ft. 9ins. high from the floor. The filling of the cistern, which takes place in a few seconds, is consequent on the main spindle being raised by pressing down the seat or foot lever. When the spindle is released the water is discharged; consequently the cistern is ordinarily empty. The discharge is obtained by the return of the stopper (F) to its original position by the aid of a weight, thus opening the outlet passage (E). The inlet valve is at the same time drawn down to its seat, so that no water can enter while the discharge is taking place. The contents of the cistern and pipe (J) are then free to pass through the outlet (E) and pipe (P) to thoroughly flush the pan (S). To prevent any vacuum or a sluggish discharge and to accelerate the flush air is admitted through the balance valve (O) in addition to that through the air passage (L) to take the place of the faling water. The trumpet-shaped part at the bottom of the cistern produces an after flush for sealing the trap, and assists in rendering the closet silent in action (its efficiency in this respect is remarkable). Noise from incoming water is prevented by it having to force through its own body. The ball-valve is entirely dispensed with by this arrangement. It should be particularly noted that there is no waste of water in this system, because water cannot pass the inlet valve while the discharge is proceeding, which always occurs with the ordinary system. It is claimed that at least 20 per cent. of the water supply is saved when the supply is taken through a meter, while there is a much greater saving if "The Only" with its two gallons be compared with any other of the low-down type construction, in which a three-gallon flush has to be provided, but even then with inferior results. It may be mentioned that in the new Tollard Royal Hotel, in Southampton Row, London, where Grundy's "The Only" closet is fitted throughout there are no separate urinals. The head of water varying from 8ft. to 70ft., two separate instances may be mentioned to show the range under which tests have been made. A range of 5 for infants is supplied from a 3-ft. head of water, while the other for adults is placed on the direct main at a pressure equalling 160ft. head. For general use it will be found the head from the separate tank which the law, if enforced, compels to be provided will vary from 6ft. to 50ft.; these are equally easy when used by children of from three or four years of age.

Regarding seats to W.C.'s, there is the ordinary lift-up wood seat which allows the closet to be used as a urinal. For invalids and the infirm arms are provided as rests and assistants. For public conveniences, hospitals, &c., the seats sometimes consist of thigh rests made in hard wood screwed to the rim of the closet, into which they are sometimes let. Numerous attempts have been made to obtain a thoroughly non-absorptive material for seats which will at the same time not be cold to the touch. Messrs. Adamsez, Ltd., have recently solved the problem by placing their "Hygest" seat on the market. This is made an integral part of the closet. It cannot twist nor split, and feels to the touch like wood.

A point of difficulty in the plumber's work of fixing the closet to the soil pipe is the connection between the earthenware and the lead or iron pipe. It is customary to use some form of collar. The most satisfactory arrangement is Doulton's patent "Metallo-Keramic" joint. This was awarded the only gold medal for joints at the Sanitary Congress held in Liverpool in 1894. The closet is finished and fired in the usual way, and then the outlet is coated with a certain preparation and refired. A short length of lead soil pipe is soldered on the prepared part. The connection between the metal and pottery is so perfect that the lead can only be removed by breaking off the surface of the ware at the same time.

(*To be concluded.*)

BUILDING TRADE IN 1906.

Last year was a bad one for the building trade in almost every part of the country, being worse even than 1905. Reports are not to hand for every centre, but below will be found reference to the larger centres. The restriction of speculative building has been particularly noticeable. There seems every prospect, however, of this year seeing a welcome revival, and we are fortunately able to record that all centres are uniformly very hopeful.

England.

Birmingham.—For the first seven or eight months of 1906 the building trade was fair, but, as was to be expected, there was a falling-off in the autumn. Many works of reconstruction and extension have been carried out, and numerous extensive factories and warehouses erected. The total number of dwelling-houses erected within the city during the year is about 700, which is up to the average of late years. The president of the Master Builders' Association recently said that £40,000 less had been paid in wages in 1906 than in 1905.

Bradford.—In 1904 the building trade was supposed to have reached its lowest ebb, but 1905 proved worse, and 1906 has been, if anything, still worse again. Few contracts of note have been carried out, and speculative building has been stagnant. The stone trade has not been so poor for many years. Quarries have had a difficulty to keep going, and prices have fallen. Brickworks have felt the depression, though prices have been maintained. Timber has been stiff in price.

Halifax.—There has been considerable depression in the building trade, although the number of houses approved was 27 more than in 1905, and the number of plans submitted was only 1 less than in 1905.

Huddersfield.—In this district building operations have been largely confined to the completion of chapels and schools, the Butterley reservoir, the sewage works, the West Riding Lunatic Asylum at Storthes Hall, the extension of a few mills, and the putting up of a moderate number of speculative houses. Very little has been done in building business premises.

Hull.—Although the building trade in the early part of the year was slack, of late there has been signs of revival. A number of big contracts are in progress.

Leeds.—Of public buildings in hand, the Y.M.C.A. building, now nearing completion, is one of the largest, while the chief industrial schemes include two or three important clothing warehouse extensions and printing works. Some idea of the falling-off in the building trade in Leeds may be gathered from the following figures, showing the number of buildings erected in the city from April 2nd to December 12th, 1906—just over eight months—as compared with the corresponding period last year :—

	1906	1905
Houses	897 ...	1,316
Miscellaneous Buildings ...	1,168 ...	1,061
Sanitary Conveniences ...	2,536 ...	3,204
Total Buildings ...	4,601 ...	5,581

Liverpool.—The building trade has been fair. Several important buildings have been carried out, notably the Cotton Exchange. The Liverpool Cathedral works are slowly proceeding.

Manchester.—The building trade has been fairly active. Several important contracts have been carried out or are in progress, notably the new Stock Exchange, the Royal Infirmary, and the Fire Station.

Newcastle-on-Tyne.—Last year was quieter than 1905. The considerable amount of rebuilding of business premises which was noticeable before has stopped, it seems, for the present. In July the new railway bridge across the Tyne, the completing wing of the Armstrong College, and the new Royal Victoria Infirmary were all opened by the King. Later in the year the new Health wing of the Durham University College of Medicine was opened. Also worthy of note are the new baths and washhouses at the corner of Gibson Street, and the addition to the City Hospital for Infectious Diseases at Walker. This year offers a prospect of greater building activity. The City Council have resolved on a great scheme of improvement in the extension of Market Street through to New Bridge Street, and the construction of new streets in the area lying between Pilgrim Street and Trafalgar Street and Worswick Street and New Bridge Street, at a cost of about £800,000. Private enterprise has also much in view.

Salford.—The building trade has been quiet in the past year. A number of small public improvements have been caried out.

Sheffield.—The building trade has been slack. Large extensions at works have been carried out in the East End, but these have not affected the building trade much, as they have consisted most of steel sections and galvanized iron sheets. Fewer houses have been erected than in former years. Only 1,808 houses have been certified against 1,970 in 1905, and the number of buildings completed other than houses totals 337 as against 420 in 1905.

York.—1906 is stated to have been the worst for six or seven years past. The only work of note has been the constant extensions at the well-known cocoa works, where further extensions are contemplated. The extensions last year were carried out in reinforced concrete.

Scotland.

Aberdeen.—The past year has been the leanest of three exceedingly lean years in the building trade, and bad as the situation is the prospect is no better, local builders being of opinion that no improvement will take place for the next three or four years. Marischal College, the Post Office, and His Majesty's Theatre were completed in 1906, and there is now no outstanding job in progress in the city. Several quarries in Aberdeenshire have been closed.

Dundee.—The report for 1906 is no better at Dundee, but the prospect seems more encouraging. Two district libraries are to be erected, and possibly a central reading room, as well as the new technical institute and a new physical laboratory at University College.

Edinburgh.—A slight improvement in the building trade is reported from Edinburgh as compared with recent years, and the improved prospect is rather brighter than it was at the beginning of 1905 or 1906. During the past year a large building has been erected at the corner of Princes Street and St. Andrew's Street for Messrs. Forsyth, Ltd.; an addition has been completed at Messrs. Nelson & Sons' printing works at Parkside (a reinforced concrete building); and the King's Theatre in Leven Street has been erected; also new premises in Princes Street for the North British & Mercantile Insurance Co., and a new Roman Catholic church at Portobello.

Leith.—While the building trade in Leith has improved during the past year compared with 1905, it is still in a depressed condition.

Elgin.—The building trade has been only moderately busy during the past year.

Glasgow.—During the past year considerable progress has been made with the Central Station Hotel extension in Hope Street, the new parcels-post office building in Waterloo Street has been practically completed, and various office blocks in the city have been erected. Work on the reconstruction of the Royal Infirmary has been proceeded with. Structural steel firms report a satisfactory year.

Peterhead.—The building trade has been good during the year, the chief feature being the large number of villa residences that have been erected.

Fraserburgh.—The year has been a fairly brisk one for the whole of the building trades.

The building trade in the Seaham district is at present exceptionally brisk.

"Wainy" Timber.—At the Alfreton County Court recently, Messrs. Lee and Kirk, builders, of Alfreton, sued Evence Coppee, an engineer and contractor, residing at Westminster, who was erecting coke ovens at Pinxton, for £17 16s., the value of timber supplied by contract to the defendant at Pinxton which was refused. The plaintiffs explained that in August the defendant asked for the price of 3500 sq. feet of spruce planks, 2in. by 7in. for delivery at his Pinxton works. With certain variations in the measurements of the wood the plaintiffs quoted £37, which was accepted. They ordered the timber from Southern's, of Manchester, and two lots were delivered direct to Pinxton. The defendant's agents complained about the size of the timber. Plaintiffs went to Pinxton and saw it. The timber was of very fair quality for foreign-sawn wood. He did not recommend the use of that wood at the time as it was "wainy" and the size of the planks varied. They offered to take all the timber, which was too small, back again, and the firm of timber merchants who supplied it cancelled the order because they had a ready sale for it, when the defendant refused it. About 30 per cent. of the wood was "wainy" on one side and the thickness varied. If the contract had been completed he would have got 7s. 6d. out of it. For the defence it was stated that the works were costing about £65,000 and the wood was needed for flooring for machinery and it was important that there should be nothing in the floor which would cause workmen or others to trip. It was not of the nature and quality agreed upon. His Honour in giving judgment said the defendant was only entitled to have spruce planks at a certain thickness, and of a merchantable quality. He had come to the conclusion that a reasonable quality had been supplied, but he believed that the plaintiffs had supplied planks of a greater variety in thickness than they ought to have done. The plaintiffs must be non-suited with costs.

The Month's Trade

Reports by our Special Correspondents.

THE CLAYWORKING INDUSTRY.

Last month employment in the brick and tile trades has naturally been somewhat dull owing to the time of the year. Employment indeed was worse than a month ago and a year ago on the whole, but the outlook is unclouded.

Employment in South Staffordshire and Shropshire has been dull. In the Peterborough district it has continued slack, and showed a decline on the previous month. At Nottingham short time has been general. In South Wales employment has continued good; in Devonshire it has been fairly good; at Ipswich, Sudbury, Chelmsford, and Oldham, and in the Tees and Hartlepool district it has been fair. In North Wales it has been dull at Ruabon and Wrexham, and fair at Mold.

The increased cost of fuel will doubtless result in prices being raised for bricks, especially blue bricks.

THE STONE, GRANITE, MARBLE AND SLATE TRADES.

These particular trades seem to be well employed considering the time of year. The mild weather has continued with but few breaks, and a good many contracts are in hand at the various quarries; in fact, employment does not seem to have slackened off to any considerable extent, as one would ordinarily expect.

Employment in the limestone quarries in Weirdale and South Durham has continued good in the past month, and also in the Plymouth district. Employment was very quiet in the Buxton district, and it was bad in the Somerset blue lias quarries. Employment has been dull in the Bath and Portland stone quarries.

Sandstone quarries in the Rowsley district have been moderately well employed. Employment has been fair in the Sheffield and Barnsley district, where, however, the weather has caused some interruption. Employment in the sandstone quarries in North Wales has continued good. At Gateshead trade has been moderate. In the Gloucestershire Pennant stone quarries employment has been bad, and this has also been the case in Forfarshire.

As regards the granite quarries, those in Aberdeenshire have been fairly well employed on the whole. In North Wales, too, employment has continued good, but in Leicestershire, Devonshire, and Cornwall employment has been dull and rather worse than in the previous month.

In regard to settmaking, employment has continued good in North Wales, and fair in Aberdeenshire and in the Clee Hill district. It has been fair and better than a month ago at Edinburgh. At Rowley Regis also it has been better than a month ago. At Glasgow and Airdrie employment has been fair on the whole, but showed a decline. At Stoney Stanton (Leicestershire) employment has been dull, and showed a further decline.

The road material quarries in the Cleehill district have continued to be fairly employed, while employment in the Chert quarries in Derbyshire has continued to be good.

The marble trade is quiet. Mr. Bodley recently uttered a plea for a marble London, and the first step to a realisation of his dream seems to be the decision to use white Pentelikon marble (the same as used in the Parthenon) for Mappin & Webb's new premises in Oxford Street. The Greek marbles are distinguished for their weather resistance. In this case the marble will come from the Marmor quarries.

We are at last able to state that there is some improvement in the slate trade. Employment has continued quiet in North Wales in the Festiniog district, but remains fair in the Carnarvon district. Employment has continued dull in Ballachulish in Argyllshire. It is reported, however, that for several weeks past the stocks have been steadily diminishing in the several quarries in North Wales, and this increased demand has encouraged the quarry owners in the Carnarvon district to put up the prices on all sizes. This revision list will come into force this month. Prices have been advanced to bring them into line with Penrhyn and Dinorwic. After this long spell of depression it looks from this that there is some prospect of the slate trade looking up a little in the near future. It had up to recently hung back from the general improvement in all other branches of the building trades.

The Board of Trade has been negotiating with Germany on the question of tariffs, and Mr. Lloyd-George, as President of the Board of Trade, has addressed the following leter to Mr. Osmond Williams, the member for Merionethshire:—"You will be interested to hear that we have obtained from the German Government a tariff concession which will be of great importance to the slate quarries of North Wales. You will recollect that some time ago the North Wales quarry-owners were greatly concerned at an alteration made in the German tariff, and you made arrangements for a deputation to me on the subject. This alteration would have involved that all Welsh roofing slates imported into Germany either should have a hole pierced in them so as to prove that they were not intended for use as school slates or should be of a thickness of 5 millimetres or more. If one of these conditions was not fulfilled the slates were to be dutiable at a prohibitively high rate. On the other hand, pink and green slates of a character which is scarcely produced at all in North Wales, but is largely produced on the Continent, was not to be subjected to these restrictions. Obviously the result would have been a most unfair discrimination against Welsh slates, and as soon as the matter was brought to our notice we took steps to have the German Government approached on the subject. After correspondence extending over some months you will be glad to learn that we have now induced the German Government to withdraw the regulation as to piercing and to issue instructions which will permit our blue and blue-grey slates to be imported at the lower rate of duty even down to a limit of 3 millimetres in thickness. This limit, we understand, will be entirely satisfactory to our interests as embracing within its scope all the slates exported for roofing purposes from North Wales to Germany."

THE PORTLAND CEMENT TRADE.

As is usual at this time of the year the demand for the home trade has slackened, but manufacturers nevertheless appear to be satisfied with the position, as their figures show an improvement on the volume of trade of a year ago. Prices certainly are not easier, and as the export business continues exceptionally good, it seems more than probable that an advance will be established before very long. The year just closed was unique in the way that for the first time for many years past, the exports of Portland cement from this country have shown a very large increase, while the imports have shown a substantial diminution; in fact, these latter were lower than at any time since the year 1900. There is every indication that the export demand will continue to show satisfactory signs of increase during the New Year, and we hear in several quarters of exceptionally large commitments which have already been made for several important markets. Manufacturers doing this class of business have been much concerned of late, owing to the enormous rise in the price of fir staves, which we are informed has increased cost by at least 3d. per cask, and this coupled with the increased cost of manufacture explains the relatively high figures which manufacturers are now asking for this business. It is doubtful whether manufacturers are really making larger profits at the increased prices now ruling than they were a year ago when figures were substantially lower, owing to the considerable increase in the cost of fuel, sacks, staves, etc., etc. Under these circumstances one may readily understand their desire to see an advance established, particularly having regard to the increased volume of trade, although that is admittedly very largely due to the improved foreign position. With a fairly open winter and no substantial increase on the present stocks, it may be taken as certain that an advance of some sort will be established in the early spring.

The Cambridge district seems now to be specially favoured for the establishment of new Portland cement works. A prospectus is in circulation of a company to be known as the National Portland Cement Co., Ltd. The capital is £36,000, divided into 16,000 six per cent. cumulative preference shares of £1 each and 20,000 ordinary shares of £1 each. The objects of the company are stated to be "to acquire about 101 acres of freehold land situate on the Cambridge and Hitchin branch of the Great Eastern and Great Northern Railways, in Cambridgeshire, for the purpose of erecting up-to-date works for the manufacture of Portland cement."

Don Roberto Weber is forming at Concepcion, in Chile, a company entitled "Compañia de Cemento Artificial y Cerámica," with a capital of 600,000 pesos (about £37,500). The company will devote itself mainly to the manufacture of artificial cement.

The "North American Portland Cement Company" have obtained a perpetual charter in New Jersey by filing articles of incorporation setting forth that they propose to manufacture and deal in Portland cement, &c.

ABSTRACT OF STOCK, CONSUMPTION, &c., IN LONDON DOCKS, FOR DECEMBER.

All Docks.	Deals (Fir).	Battens (Fir).	Pine.	Spruce.	Pitch-pine Deals.	Deals and Battens in Aggregate.	Rough Boards (All Countries).	Flooring.	Floated Timber.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Loads.
Public dock stock - - -	2,023,833	4,040,417	739,093	1,116,552	53,392	7,973,287	4,950,911	8,171,943	25,047
Monthly public dock consumption - - - -	180,601	339,751	56,054	82,352	9,005	667,763	349,418	794,861	2,746
Overside stock - - -	767,554	1,443,942	238,229	349,996	—	2,799,721	1,485,026	1,263,829	—
Overside consumption (estimated of dock):—									
111 per cent. Sawn 60 ,, Planed	200,467	377,124	62,220	91,411	—	731,222	387,854	476,917	—
Duration of supply at same rate of consumption - -	7.33 months.	7.65 months.	8.26 months.	8.44 months.	5.93 months.	7.70 months.	8.73 months.	7.42 months.	9.12 months.

THE TIMBER TRADE.

The abstract of dock stock, consumption' &c., for December, published by Messrs· Foy, Morgan & Co., in given in the table above. Reports on the timber trade of 1906 will be given in our next issue.

THE IRON AND STEEL TRADES.

The past month has been interrupted by holidays, and consequently there has not been so much doing. The blast furnaces have been in want of fuel due to the holidays and scarcity of wagons. The demand, however, continues as strong as ever. The Continent and America are still making demands on our pig-iron and the public dock stock continues to diminish as the supply is not equal to the demand. Everything shows a most hopeful prospect. There is a small momentary drop in the price of pig-iron due to speculation, but it is not likely to continue for long.

In regard to manufactured iron the past month has not resulted in much business, and the works have been kept busy on orders already booked. It is confidently expected, however, that there will be plenty of orders going as soon as things settle down.

The Lancashire market is strong, both as regards pig-iron and manufactured steel.

In South Staffordshire there is no change to record. There has been some speculation as to the possibility of an increase in the price of fuel, but it is thought that no immediate disturbance of the situation is likely. Orders for manufactured iron are freely received.

In the North of England, owing to lack of fuel for part of the month, the production of pig-iron was somewhat curtailed. Manufacturers are also complaining of the shortage in the supply of wagons by the North-Eastern Railway Co. In manufactured iron and steel there is nothing new to report.

As regards the foreign market the expected advance in Belgian joists has taken place. The Continent and America continue to buy pig-iron.

OTHER METALS.

Copper is still in strong demand, and there seems no prospect of prices falling.

The tin market is also favourably situated.

Lead has risen slightly on last month, and the market is in a strong position.

THE IRONMONGERY TRADE.

Employment in the lock and latch trades at Wolverhampton has continued bad; with hollow-ware workers it has been good. With hollow-ware stampers it has been fair at Sheffield, and better than a month ago. At West Bromwich it has continued quiet with hollow-ware makers.

Employment has been quiet in the stoves, grates, &c., trade at Rotherham and Leeds; bad at Falkirk and Glasgow; good at Bolton and Bury.

With nut and bolt makers employment has been fair at Winlaton and Birmingham, good at Dudley and Darlaston. At Birmingham it has been good with wire nail makers; fair with cut nail makers. At Blackheath it has continued quiet with rivet makers and bad with nail makers.

In the wire trade employment has continued good generally.

THE GLASS TRADE.

The glass trade has continued moderately good. With sheet glass makers and flatteners at St. Helens employment has continued to be good, and an improvement has been shown with glass cutters. With pressed glass makers on the Tyne and Wear it has continued moderate. It has been fair with bevellers at Birmingham, and improved with glass blowers in London.

THE WALLPAPER TRADE.

The Wallpaper Trust seems to be meeting with competition from English firms as well as Continental manufacturers. It is stated that a company has been formed in Yorkshire to fight shopkeepers who sell non-combination papers.

A Swiss Consular report states that, owing to the great activity in the building trade of Canada, coloured wall paper is being imported in large quantities.

The Labour Market

Board of Trade Returns for November.

Employment continued dull on the whole in November. It showed little general change compared with October, but was better than a year ago.

Returns received from firms employing 60,671 workpeople at the end of November show a decline in the numbers employed of 2,298, or 3·6 per cent., compared with October.

The following table summarises these returns :—

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Tradesmen.	Labourers.	Lads and Boys.	Total.
London	11,629	7,782	842	20,253
Northern Counties and Yorkshire ...	3,550	3,368	878	7,796
Lancashire and Cheshire	4,863	4,050	1.139	10,052
Midlands and Eastern Counties...	3,672	2,807	513	6,992
S. & S.W. Counties and Wales	3,557	2,738	611	6,906
England & Wales ...	27,271	20,745	3,983	51,999
Scotland	3,475	2,058	1,003	6,536
Ireland	967	1.021	148	2,136
United Kingdom ...	31,713	23,824	5,134	60,671

From the foregoing it will be seen that the decline in the numbers employed by the firms making returns was common to all classes of workpeople and to all districts. The percentage decrease with skilled tradesmen was 3·3 over all districts, and 2·6 in London; with unskilled labourers the corresponding percentage decreases were 4·7 and 5·3 respectively.

Carpenters and Plumbers.

Returns from trade unions of carpenters and joiners and of plumbers show that an improvement took place in these trades during the month.

The percentage unemployed of trade union carpenters and joiners in the United Kingdom was 6·9, as compared with 7·6 in October, and 8·3 a year ago; and of plumbers 6·9 per cent. were unemployed at the end of November, as compared with 8·0 in October, and 11·1 in November, 1905.

Bricklayers, Masons, Plasterers, Painters &c.

Employment was dull generally except with slaters, and with plasterers in Scotland, who were fairly well employed. Compared with October some improvement was reported by slaters, and also by stonemasons in England, and plasterers and painters in Scotland; some decline was reported by painters in England, and stonemasons in Scotland. Compared with a year ago there was an improvement with slaters, and also with stonemasons in England, and plasterers in Scotland; a decline was reported by stonemasons and painters in Scotland. Bricklayers reported little change in employment compared with October and a year ago.

London.

Employment was slack generally. With stonemasons it was reported as worse than a year ago.

Northern Counties and Yorkshire.

Employment was slack generally.

Lancashire and Cheshire.

Employment was quiet at Manchester, and declined with painters and plasterers. At Oldham it was fair on the whole. At Bolton a decline was reported.

Midland and Eastern Counties.

Employment was slack generally.

Southern and South Western Counties.

Employment continued dull generally.

Ireland.

Employment was dull generally.

The Building Trade of Southport has been brisk during the past summer. The chief development of estates has been in the neighbourhood of Rutland Road, Scarisbrick New Road, and at the northern end of the town. There has also been a little growth in Crossens, and as soon as the new Vulcan motor works are started there, which it is hoped will be the case at the commencement of the new year, that part of the Southport borough will progress rapidly.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen	8	—	8	8	8	8	8	4½–5
Accrington	9	9	8½	9	7½	8½	—	5–5½
Ashton-under-Lyne	9½	10	9	10	8¼	9	8½	5½–6½
Barnsley	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness	9	9	8¾	9	9	8¼	8¼	6–6½
Bath	7½	7½	7½	7½	7½	6½	6½	5–5½
Belfast	8½	8½	8½	8¾	8	7½ 8½	8½	19s. wk
Birkenhead	9½–10	9½	9½	9½	9	—	8½	5–6½
Birmingham	10–10¾	9½	9½	10	9	9½	8½	6½–7
Blackburn	9½	10	9	9	9	9	8	5½–6½
Blackpool	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton	9½	10	9½	10	9	9	8½	6–7
Bournemouth	8	8	8	8	8	8	7½	5½
Bradord	9	9	8½	8½	9	9	8	6–6½
Brighton	9	8	8	8	8	9	7	5½
Bristol	9	9	9	9	9	9	8½	6
Burnley	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury	9½	10	9½	9	9	9	8½	5–6½
Cambridge	8½	8	8	8½	8	8½	6½	5–5½
Cardiff	9	9	9	9	9	9	8½	5½
Carlisle	8½	8½	8	8	9	8	8	5–5½
Chatham	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie	9½	9½	9	9½	9	8½	9	6
Colchester	8	8	8	9	8	9	6 6½	5–5½
Cork	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3⅝
Coventry	9½	8¾	9	9	9	9	8	6
Crewe	8½	8	7	9	8	8	7	5–6
Darlington	9	9	8½	9	9½	8	7½	6
Darwen	9½	9½	9	9	9	9	8¼	6
Derby	9	9	8½	9	9	8½	7½	5½–6
Dublin	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley	8½	8	8	8½	8	8	7	5½
Dundee	8½–9	10	9	8½	8½	9	8½	5¼–5½
Eastbourne	8½	8	8	9	pce.	8	7½	5½
Edinburgh	8½	9½	9	—	—	9	—	—
Exeter	8	8	7½	7½	7½	7½	6½	5
Glasgow	—	9½	10	9½	9	9	9	5½–6
Gloucester	7½	8	8	7½	7½	8	7½	5
Greenock	9½	10	9	9½	9½	9	9	5½
Grimsby	—	9	8	9	pce.	—	7½	6–7
Halifax	9	9	8¼	8½	8½	8½	7½	6
Hartlepools	9½	9	9½	9½	—	—	—	6½–7½
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield	9	9	8½	8½	9	7½ 8	7½	6
Hull	9¼–9¾	9	9	9	9	9	8	6½–7
Ipswich	8	8	8	9	9	8	6½	5½
Keighley	8½	8½	8	7½	8½	7½	7½	6
Lancaster	9½	10	8½	9	9	8½	8½	5½–6
Leeds	9½	9½	9	9½	9	9	8	6½–7
Leicester	9	9	9	10	9	9	8	6½–7
Leigh	9½	9½	9½	9	8½	9	8	6–6½
Lincoln	8½	8	8	9	8	8	7	5–6
Liverpool	9½–10	9½	9½	9½	9½	9½	8½	5–6
London	10½	10½	10½	11	—	11	—	—
Londonderry	7	7	7	7	6½	7	7½	15s. wk.
Macclesfield	8	8	8	7¾	6½	7½	7½	5
Manchester	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	9½	9	8	6¼–6¾
Newcastle	9½	9	9½	9½	9½	9	8½	6¼
Newport (Mon.)	8½	8½	8½	8½	8½	8½	7½	5½
Northampton	8½	8½	8½	8½	—	8½	7½ 8	5½
North Shields	9½	9½	9½	9½	9½	9	9	6¼–6½
Norwich	9	9	8½	9	9	8½	7½	5–6
Nottingham	9½	9	9	10	9	9	8½	6½
Oldham	9½	10	9½	9	8½	9	8½	5½–7
Oxford	8½	8	8	8	8	9	7	5½
Paisley	9	9½	9	9½	9	9½	9	6
Perth	8	10	8	8	8	8	7½	5½–6
Plymouth	8	8	8	8	8	8	7	5
Portsmouth	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham	9½	9½	8½	8½	8	8½	7½	6
St. Helens	9	9	9	9	9	8½	8¼	5½–6
Scarborough	8½	8½	8	8½	30s. wk.	8	7½	6
Sheffield	9½	9½	9	9	9	9	7½	5½–6½
Southampton	7½	8	8	8	pce.	8	7	5
Southport	9	9	8¾	9	9	9	8½	6
South Shields	9½	9½	9½	9	9½	8¾	8½	6¼
Stockport	9½	9½	9	10	9	9	—	6–7
Stockton-on-Tees	9	9½	9¼	9½	9½	9	8	6¼–6½
Sunderland	9½	9½	9¼	9½	9½	37s. wk.	9	6¼
Swansea	8½	—	8½	8½	—	8½	7½	5½
Torquay	7	7	7½	7	7	7	7	4½–5
Wakefield	9	8½	8	8½	8	7½	7½	6
Walsall	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington	8¾	9¼	9¼	9½	8½	9¼	—	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan	9½	10	9	9	8½	9	8½	5½–7
Wlverhampton	9	9	9	8½	8½	9	7½	6–6½
Worcester	8½	8½	8½	8½	8½	8½	7	5½
Yarmouth	7½	7½	7½	A	7½	7½	6	4½

A. Done by bricklayer.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans	per qr.	1	9	6		—	
Clover, best...	per load	4	7	0	4	17	6
Hay, good	do.	4	0	0	4	5	0
Sainfoin mixture	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

MISCELLANEOUS.

		£	s.	d.	£	s.	d.
Bricks Stocks, d/d to job	per 1,000	1	16	0		—	
Do. Flettons on rail ...	do.	1	6	0		—	
Do. Pressed Wire Cuts, d/d to job ...	do.	1	18	0		—	
Do. Blue brindled wire cuts	do.	1	3	0		—	
Do. do. wire cuts ...	do.	1	7	0		—	
Do. do. pressed facings	do.	1	18	0		—	
Coke Breeze, into carts at gasworks ...	per load	0	2	0		—	
Do. d/d to job	do.	0	4	0		—	
Sand	per yard	0	7	6		—	
Ballast	do.	0	6	6		—	
Granite Chippings ...	do.	0	10	6		—	
Do. do. ¼in. ...	do.	0	11	6		—	
Do. Broken, 1½in. ...	do.	0	15	6		—	
Do. do. 2in. ...	do.	0	15	0		—	
Do. do. 2½in. ...	do.	0	14	6		—	
Cement	per ton	1	12	0		—	
Lime	do.	1	4	0			
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds	per sq. ft.	0	0	3½		—	
Do. do. do. do. 3rds.	do.	0	0	2½		—	
Do. do. do. 21oz., 2nds.	do.	0	0	5		—	
Do. do. do. do. 3rds	do.	0	0	3½		—	
Do. do. do. 26oz., 2nds	do.	0	0	6		—	
Do. do. do. do. 3rds	do.	0	0	4¼		—	
Do. do. do. 32oz., 2nds	do.	0	0	8		—	
Do. do. do do. 3rds	do.	0	0	6		—	
Do. English patent plain rolled plate in stock crates ⅛	do.	0	0	2		—	
Do. do. do. 3/16	do.	0	0	2¼		—	
Do. do. do. ¼	do.	0	0	2½		—	
Castor Oil, French ...	per cwt.	1	9	0		—	
Colza Oil, English ...	do.	1	12	6		—	
Copperas	per ton	2	0	0		—	
Lard Oil	per cwt.	2	15	0	2	17	0
Lead, white, ground, carbonate	per ton	16	0	0		—	
Do. red	do.	15	0	0	19	0	0
Linseed Oil, barrels ...	per cwt.	1	1	3		—	
Petroleum, American ...	per gal.	0	0	6¾	0	0	6⅞
Do. Russian ...	do.	0	0	6¼	0	0	6⅜
Pitch	per barrel	0	12	0	0	13	0
Shellac, orange	per cwt.	10	13	0	10	14	0
Soda, crystals	per ton	3	2	6	3	5	0
Tallow, Town	per cwt.	1	12	6	1	13	0
Tar, Stockholm	per barrel	1	5	0		—	
Turpentine	per cwt.	2	10	3		—	
Granite Chippings ...	do.	0	10	6		—	
Do. do. ¼in. ...	do.	0	11	6		—	
Do. Broken, 1½in. ...	do.	0	15	6		—	
Do. do. 2in. ...	do.	0	15	0		—	
Do. do. 2½in. ...	do.	0	14	6		—	
Do. Kerb, Norwegian 6×12 and 12×6 in river	per foot	0	1	2		—	
Do. do. do. circular	do.	0	1	5		—	
Do. do. do. 12×8 in river	do.	0	1	5		—	
Do. do. do. circular	do.	0	1	8		—	
Do. do. Guernsey 6×12 in river	do.	0	1	4		—	
Do. do. do. circular	do.	0	1	6		—	
Do. do. do. 12×6 do.	do.	0	1	6		—	
Do. do. do. do.	do.	0	1	8		—	
Do. do. do. 18×8 do.	do.	0	1	8		—	
Do. do. do. do.	do.	0	1	10		—	
Do. Pitchings Norwegian. 3×6	per ton	1	8	0		—	
Do. do. do. 3×7	do.	1	10	0		—	
Do. do. do. 3×5	do.	1	9	0		—	
Do. do. do. 4×5	do.	1	8	0		—	
Do. do. do. 4×4	do.	1	13	0		—	
Do. do. do. 4×6	do.	1	5	0		—	
Do. do. do. 5×6	do.	1	4	0		—	
Do. do. do. 5×7	do.	1	4	0		—	
Do. do. do. Special, 4×6	do.	1	11	0		—	
Do. do, do. do. 5×7	do.	1	18	0		—	
Do. do. Guernsey, 3×6	do.	1	10	0		—	
Do. do. do. 3×7 & 3×9	do.	1	8	6		—	
Do. do. do. 3×5	do.	1	10	0		—	

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	105	0	0	106	0	0
Do. Strong sheets ...	do.	123	0	0	124	0	0
Lead, soft foreign... ...	do.	19	15	0	20	0	0
Do. English	do.	19	17	6	20	0	0
Do. pipes...	do.	23	7	6	23	10	0
Do. sheets	do.	23	0	0	23	5	0
Galvanised Corrugated sheets	do.	14	0	0	14	5	0
Spelter G. M.	do.	27	15	0	27	17	6
Angles, Scotland	do	6	17	6	7	0	0
Bars, do.	do.	7	17	6	8	0	0
Marked bars, Staffs. ...	do.	8	17	6	9	0	0
Common bars, do. ...	do.	7	7	6	7	10	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	10	0	6	15	0
Angles, Midlands	do.	6	17	6	7	0	0
Joists do.	do.	7	2	6	7	5	0
Girder plates, Midlands ...	do.	7	15	0	7	17	6
Angles, Foreign, c.i.f. Thames	per ton	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	7	6	6	10	0
Channels do. do. do.	do.	6	10	0	6	12	6
Plates do. do. do.	do.	7	7	6	7	10	0
Tin, Foreign	do.	189	0	0	190	0	0
Do. English ingots ...	do.	190	0	0	192	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	10	0	32	0	0

TIMBER.

Soft Woods.

		£	s.	d.	£	s.	d.
Fir, Dantzic and Memel	per load	3	10	0	4	17	6
Pine, Quebec, Yellow ...	do.	3	12	6	6	10	0
Do. Pitch, American ...	do.	3	16	0	6	0	0
Laths, log, Dantzic	per cu. fath.	4	0	0		6—0	
Deals, Archangel, White, 2nd, 3×9	per std.	9	15	0	10	0	0
Do. do. do. 3rd, 3×9	do.	9	0	0		—	
Do. do. Larch, 3×11	do.	9	0	0		—	
Do. Fredrikshamn, Yellow, unsorted, 2×3½	do.	8	15	0		—	
Do. Kotka do. do. 2½×7	do.	9	10	0		—	
Do. Kovda, white, 2½×7	do.	8	10	0		—	
Do. Norrkoping and Oxelosund, Yellow, 1st, 4×9	do.	11	0	0		—	
Do. do. do. 2nd, 4×11	do.	8	10	0		—	
Do. do. do. do. 4×9	do.	8	15	0		—	
Do. do. do. do. 3×11	do.	8	10	0		—	
Do. do. do. do. 2½×9	do.	8	5	0		—	
Do. Norrkoping and Orefors, Yellow, 1st and 2nd, 3×7	do.	8	10	0		—	
Do. Pernoviken, do. 1st & 2nd, 2½×7	do.	9	5	0		—	
Do. Quebec Spruce, 3rd, 3×9	do.	9	5	0		—	
Do. Riga, White, unsorted, 3×8	do.	8	5	0		—	
Do. do. do. do. 3×7	do.	8	5	0		—	
Do. St. Petersburg, do. 1st, 3×9	do.	9	10	0		—	
Do. do. do. 3rd, 3×7	do.	8	15	0		—	
Do. do. do. do. 2½×7	do.	8	5	0		—	
Do. do. Yellow, dry, 1st, 3×9	do.	14	10	0		—	
Do. do. do. 2nd, 3×9	do.	9	5	0	9	10	0
Do. do. do. 3rd, 3×9	do.	8	0	0		—	
Do. Sundswall, Yellow, unsorted, 3×9	do.	9	0	0		—	
Do. Wyburg do. do. 3×4½	do.	7	15	0		—	
Do. do. do. do. 2½×7	do.	9	5	0		—	
Battens, Archangel, Yellow, 3rd, 2×9	do.	11	5	0		—	
Do. Fredrikshamn, Yellow, 1st and 2nd, 2×4½	do.	8	0	0		—	
Do. do. do. do. 2×3½	do.	8	10	0		—	
Do. do. do. do. 2×3	do.	8	15	0		—	
Do. do. do. unsorted, 2×4	do.	9	0	0	9	5	
Do. do. White, 1st & 2nd, 2×4	do.	8	10	0		—	
Do. Kovda, Yellow, unsorted, 2½×6½	do.	9	5	0		—	
Do. do. do. do. 1×4½	do.	9	0	0		—	
Do. Kotka, Yellow, unsorted, 2×6	do.	8	10	0		—	
Do. Pernoviken, Yellow, 1st & 2nd, 2×6	do.	8	15	0		—	
Do. do. do. do. 2×5	do.	8	5	0		—	
Do. do. do. do. 1×5	do.	8	10	0		—	
Do. Riga, White, unsorted, 1×9	do.	8	15	0	9	0	0
Do. Sornas, White, 1st & 2nd, 2×3	do.	8	10	8		—	
Do. Trangsund, Yellow, unsorted, 2×4	do.	9	5	0		—	
Do. do. do. do. 2×3½	do.	8	15	0		—	
Do. Torefors, Yellow, 3rd, 1×9	do.	9	0	0		—	
Do. do. do. do. 1×8	do.	9	0	0		—	
Do. do. do. do. 1×7	do.	8	15	0		—	
Do. Wyburg, Yellow, 1st & 2nd, 1×7	do.	9	5	0		—	
Do. do. do. unsorted, 2½×6	do.	8	0	0		—	
Do. do. do. do. 2×4	do.	9	5	0		—	
Flooring Boards, Domsjo, White, unsorted, ½×5½	do.	0	5	6		—	
Do. Gefle, Yellow, 2nd, 1¼×7	do.	0	12	9		—	
Do. Skonvik, Yellow, 1st, 1×6	do.	0	11	3		—	
Do Sund, Yellow, unsorted, 1×6½	do.	0	9	0		—	

Hard Woods.

		£	s.	d.	£	s.	d.
Ash, Quebec	per load	4	5	0	7	7	6
Birch, New Brunswick ...	do.	2	0	0	4	10	0
Do. Quebec	do.	2	0	0	4	10	0
Box, Turkey	per ton	6	0	0	20	0	0
Cedar, Cuba	per ft. sup.	0	0	4½	0	0	6
Do. Honduras	do.	0	0	4½	0	0	5½
Do. Tobasco	do.	0	0	5⅝		—	
Elm, Quebee	per load	4	0	0	8	5	0
Jarrah, planks	per ft. cu.	0	2	6	0	3	0
Mahogany, Average Price for Cargo, Honduras	per ft. sup.	0	0	4½	0	0	5½
Do. Tobasco ...	do.	0	0	4	0	0	5½
Do. Cuba ...	do.	0	0	4½	0	0	5½
Do. African ...	do.	0	0	3½	0	0	5½
Do. Lagos ...	do.	0	0	3½	0	0	5½
Oak, Wainscot	per log	2	5	0	6	0	0
Teak, Indian, logs ...	per load	9	5	0	19	10	0
Do. do. planks ...	do.	13	15	0	20	10	3
Whitewood, American, logs	per ft. cu.	0	1	3	0	1	6
Do. do. planks and boards ...	do.	0	1	3	0	3	6

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CONTRACTORS' SUPPLEMENT (MONTHLY).
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MODERN PLUMBING.—III.

(Concluded.)

Urinals.

Urinals are of two types, the circular or flat back and the projecting lipped basin. The former discharges into a channel which is trapped with a gulley, while the latter is trapped in itself. The divisions of stalls may extend right back or may stand separate so as to allow a hose to be used behind. There are several designs for circular backed urinals in which there are few joints and these not exposed to urine, and which avoid splashing, points which deserve attention.

Soil Pipes.

Soil pipes are made of cast-iron or lead, the former, of course, are the cheapest and most used, but lead pipes are generally preferred. Undoubtedly the life is longer and better connections can be obtained, for lead pipes have about half the number of joints that iron pipes have. Cast-iron pipes are made glass-lined or glazed inside.

There is not much to be said about lead soil pipes, except that they lend themselves to decorative treatment in the way of ornamental sockets. In fixing lead soil pipes there is the sagging of the pipes to be guarded against.

For fixing with cast-iron soil pipes, there are special bends and traps made, such as, for instance, Fig. 32, which is a roof syphon to clear a 6-in. eaves gutter. As regards the fixing of iron soil pipes to walls, Figs. 33 and 34 show the two types of holderbats supplied by Mr. John Jones, of Chelsea. The former, it will be noticed, is fixed into the wall, the latter is nailed. Messrs. Lockerbie & Wilkinson, Ltd., have an ingenious patent fixing known as the "Duecless." This consists of a perforated circular plate with a centre slot. This plate can be easily nailed to the wall because one perforation or another will be sure to be over the brickwork joints into which the fixing nails are hammered. Upon the pipe junction there is a revolving plug, which fits into the centre slot, which engages with plate when turned round. The ordinary loose socket, as in Fig. 35, with ears or lugs, has a very unsatisfactory appearance, and the patterns which Messrs. Lockerbie & Wilkinson have introduced, in which these lugs are enlarged to be the same depth as the socket itself, is very superior. One design is given in Fig. 36.

Every joint in a cast-iron soil pipe should be made with lead if it is to be efficient. The usual method is to pour in molten lead, and caulk this when cold. The caulking is rendered necessary by the shrinkage of the lead in cooling, but caulking is never entirely satisfactory. The lead often comes out of the joint after a time. A new speciality is offered which is finding favour for replacing the ordinary caulking of molten lead; this is lead wool, which consists of shredded lead. Strands of this material are wound round the pipe and caulked home in small quantities at a time. The result is that the joint is very strong, being thoroughly consolidated. In fact, tests have shown that joints made in this way will stand enormous pressure without bursting.

Ventilation.

While we are on the subject of soil pipes, we naturally have to consider their ventilation, the outlet is generally only provided with a wire guard. The inlet is usually provided with a mica flap; this however very frequently becomes inoperative after being in use for some time, owing to interference or decay of the bearings, but fortunately the remedy has been recently offered by Mr. Grundy, of the Sanitary Appliances Syndicate, Ltd., who has adapted a very delicate yet strong and lasting balance valve to the air outlet, which is operated by a very light puff of wind or suction. The mechanism of this is shown in Fig. 37. It will be seen that the stopper is kept in position by a counterpoise weight.

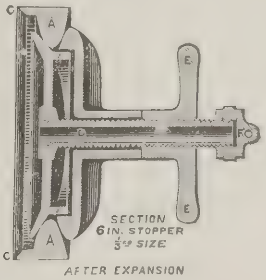

FIG. 38.

Testing.

We may perhaps step aside at this point to consider the testing of drainage and plumbing systems. There are, of course,

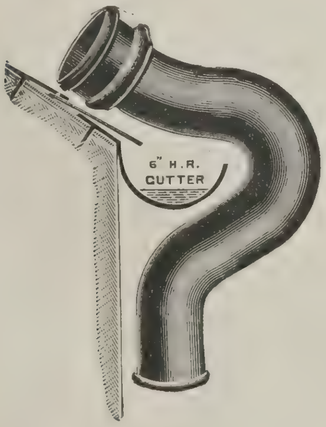

FIG. 32.

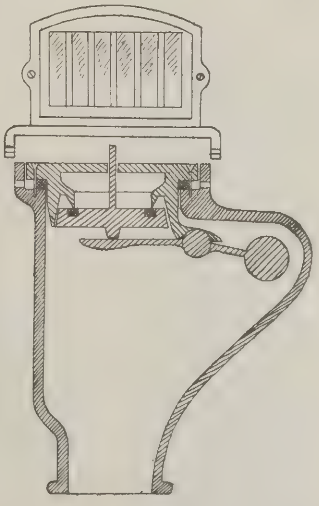

FIG. 37.

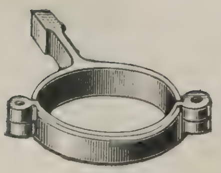

FIG. 33.

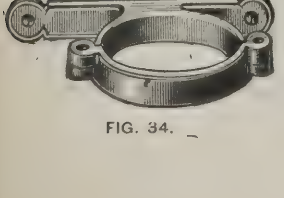

FIG. 34.

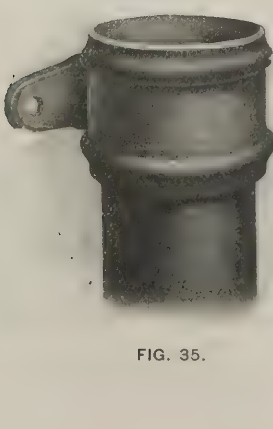

FIG. 35.

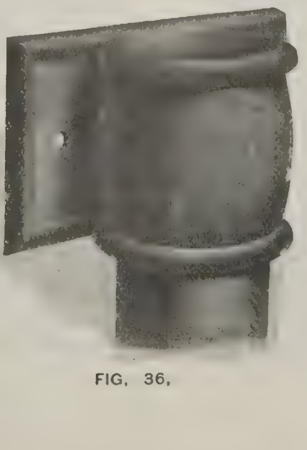

FIG. 36.

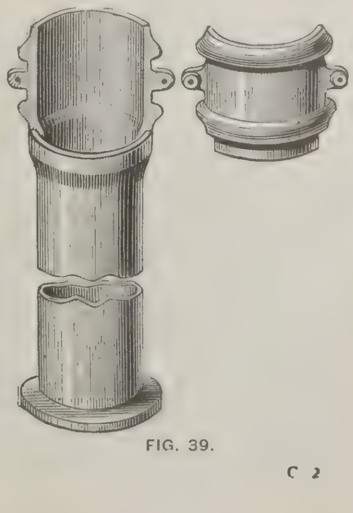

FIG. 39.

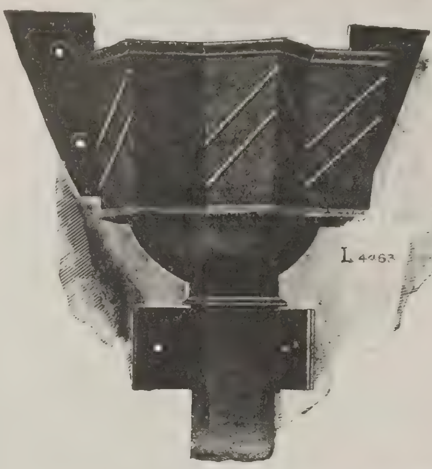

Fig. 40.

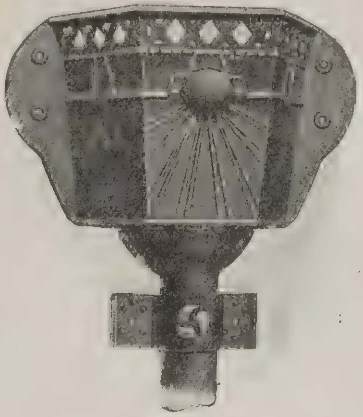

Fig. 41.

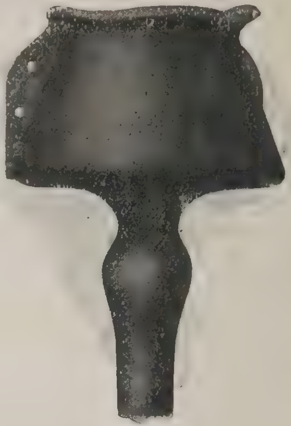

Fig. 42.

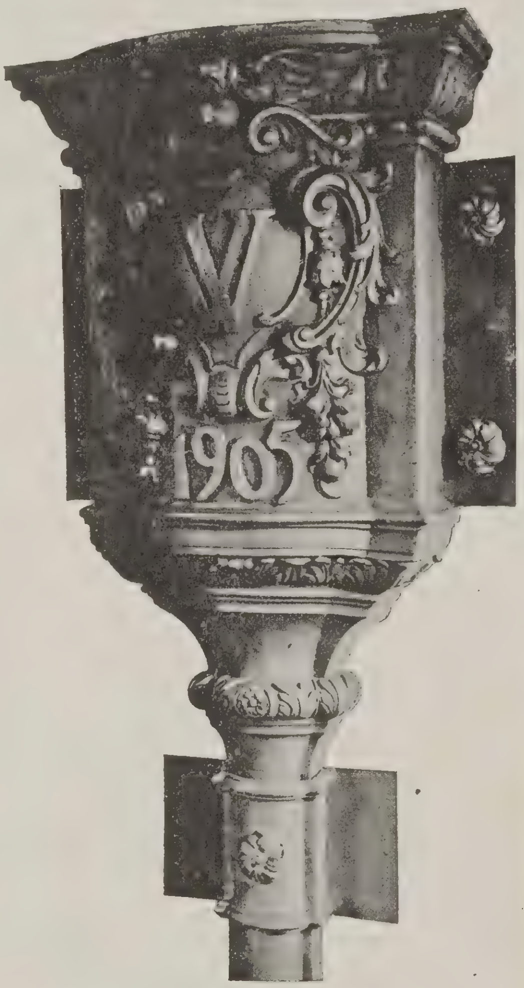

Fig. 43.

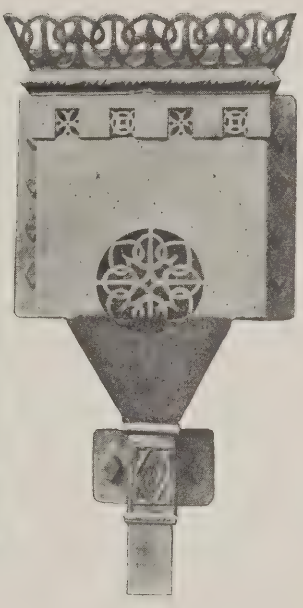

Fig. 44.

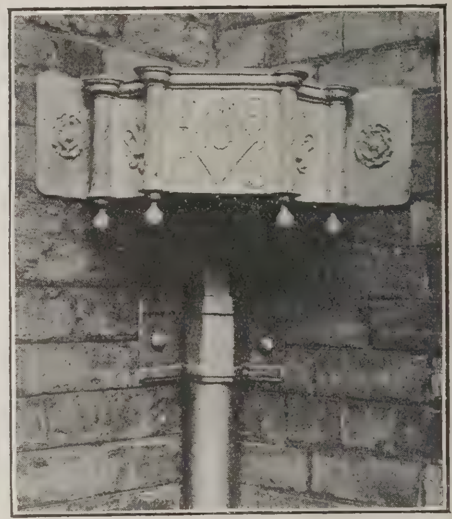

Fig. 45.

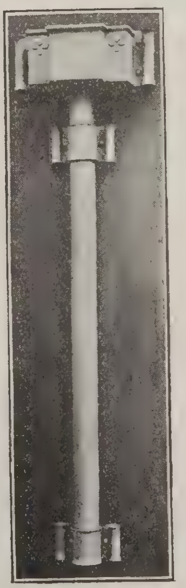

Fig. 46.

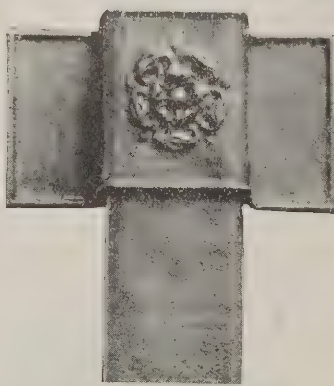

Fig. 47.

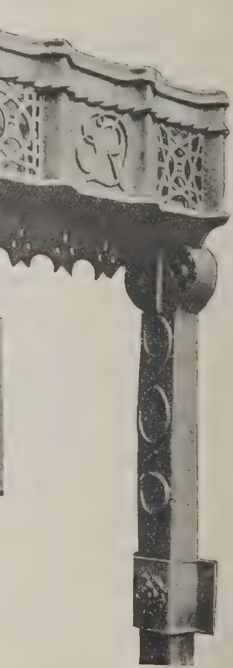

Fig. 48.

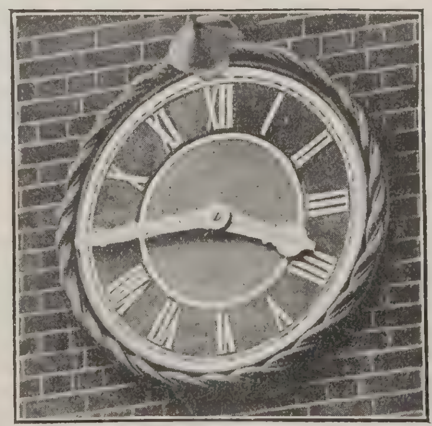

Fig. 50.

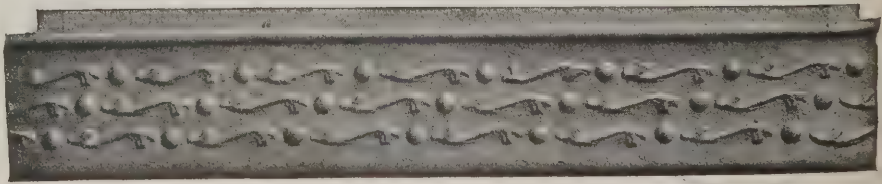

Fig. 49.

MODERN DECORATIVE PLUMBING DETAILS.

the smoke and the scent tests which have their advocates, but the older water test has not been supplanted. For all tests the plumber needs some form of stopper. One variety is made in the shape of a big bag, which is blown out to fill the pipe, but the more usual form is an expanding ring, such as the "Addison" variety, supplied by Messrs. Nicholls & Clarke, which is shown in Fig. 38. This has the merit of not pinching the rubber. For smoke tests there are special smoke-producing machines on the market.

Down Pipes and Decorative Plumbing.

Coming now to rain-water down pipes and external plumbing, here again lead may be used throughout, or cast-iron pipes and details may be preferred. There has been no particular change in matters of principle, the only difference in modern practice being a revival of interest in decorative treatment, especially in lead work. Fig. 39 illustrates a useful fitting in connection with rain water down-pipes. This is a movable socket supplied by Mr. T. A. Harris, of Blackfriars Road, S.E. This socket is constructed for the purpose of preventing the breakage in repairing, and the clearing of obstructions which may occasionally occur. The loose half-socket, as shown in the illustration, is removed or attached at will by means of gunmetal screws. Messrs. Lockerbie & Wilkinson deserve great praise in their endeavour to get more taste and variety into the use of stock cast-iron rain-water heads and down pipes. Fig. 40 shows a typical head of a pleasing design by Mr. D. W. Kennedy, architect. Another good design is Fig. 41. These are both essentially designs for casting in iron. This firm have also paid attention to decorative cast-iron gutters.

Coming now to decorative lead work, a stock pattern of rain-water head made by Messrs. Lockerbie & Wilkinson is shown in Fig. 42. This is essentially a design for casting in lead, and should be compared with Figs. 40 and 41, which are iron heads.

Messrs. George Wragge, Ltd., have executed a great deal of decorative lead work. Fig. 43 shows one of their heads for Messrs. Waring's new premises in Oxford Street, London, W. The weight of this head was 6½cwts., and it was supported by steel girders let into pockets at the back of the head. The front and sides, including all the ornament, were cast in one piece, the latter being undercut. Figs. 44 and 45 also show other lead rain-water heads made by Messrs. Wragge. The latter is a head made for Mr. G. H. Kitchen, architect, of Winchester, used in the restoration of Horsley Hall, Wrexham.

We are also indebted to Messrs. Henry Hope & Sons for Figs. 46, 47, 48, 49 and 50, which are interesting modern lead details. The lead head, Fig. 48, is one of several made for Mr. Halsey Ricardo for Mr. Debenham's coloured glazed-ware house in Addison Road, London, S.W. The date, rosettes and back of plaits were picked out with vivid heraldic colours, and some portions were gilt. The small cylinder under one end is a case to cover an iron pipe which is built into the wall to support the head. The pipe and gutter (Figs. 46 and 49), are typical treatments. The clock (Fig. 50) is a very interesting application. This is situated at Messrs. Kynoch's works. It is built upon a teak frame, the letters and minute divisions being tinned and a cable twisted together from two strengths of lead pipe. That is, so far as we know, quite unique, and certainly very effective.

Messrs. Wenham & Waters have also carried out a good many lead rain-water heads, gutters, etc., for such well-known architects as Mr. Norman Shaw, Mr. W. R. Lethaby, Mr. Ernest Newton, Mr. E. L. Lutyens, and Mr. C. F. Voysey.

Builders' Notes.

A Large Granite Blast.—At the Craigmore Granite Quarries, Inverawe, on the side of Loch Etive, which belongs to the Carsluith Granite Co., Ltd., Glasgow, considerably over 100,000 tons of granite were dislodged by a highly successful blast on January 19th. A large number of the blocks are of an enormous size, some of them being over 100 tons in weight.

Scaffolding Dangers.—Two men, a bricklayer and a mason, were killed a short time ago at Ilkley Town Hall through the collapse of a scaffold. It was stated at the inquest that the cross-piece of the scaffold broke near the end, and that the wood was defective. The men, with two others, were removing a stone weighing 5cwts. on a trolley over the scaffold, when it gave way, and three of the men fell into the roadway, two of them being killed. The jury, in returning a verdict of accidental death, recommended that the Parliamentary Committee now sitting to enquire into building accidents be asked to consider the advisability of making regulations respecting the erection of scaffolding and the testing of scaffold poles. At present there are no regulations to ensure the safety of men working on scaffoldings, though in 1904 the Home Office made certain suggestions which, to quote the official memorandum, "if carried out, would tend to reduce the number of accidents occurring on buildings in course of construction or repair."

The Apprentice Question. — Speaking recently at the ninth annual dinner of the Yorkshire Federation of Building Trade Employers, held at Leeds, Mr. W. Nicholson, senior vice-president of the National Federation, said it was in the interests of the country that young men should have the old-fashioned seven years' apprenticeship to their various trades. If every master would take a reasonable number of apprentices and bind, control, and take care of them, they could put upon the labour market in due course a regular supply of well-trained and competent tradesmen.

A Fife Building Scheme.—An extensive building scheme is about to be entered upon by the Wemyss Coal Co. immediately to the north of Methil, Fife, where 600 houses are proposed to be erected. A new village is likely to spring up within the next two years.

A Wholesale Builders' Ironmongers' Association is proposed to be formed in London to meet the contingencies of the rising markets and to check the ruinous competition prevailing in the wholesale trade in the Metropolis.

Opposition to the Wallpaper Trust.—Mr. Rufus Fleming, the United States Consul at Edinburgh, reporting to the Washington Bureau of Manufacturers on Wallpaper Manufacturers, Ltd., which has for some years controlled the wallpaper industry of the United Kingdom, says that not a few of the leading retail houses in every part of the country, and particularly in Scotland, are bitterly hostile to the trust, as evidenced by a project now under consideration among English and Scottish firms to organise a company and establish works for the manufacture of certain classes of paperhangings.

Bradford Master Plumbers and the new Institute.—At the recent annual meeting of the Bradford Branch of the National Association of Master Plumbers, Mr. Howroyd was elected president. Approval was expressed with the newly-formed Institute of Plumbers, which, it is hoped, will secure the education of apprentices, a better standard of workmanship, and a fuller guarantee of competency for the public. It was recognised that the Plumbers' Company up to the present time had not been a sufficient success to warrant the general support of the craft, and it was contended that registration had been too easy, offering no guarantee of a man's ability. In the future it was hoped that the Institute of Plumbers would be recognised in the premier position as an educational and certificating body throughout the country. One satisfactory result would be the formation of a recognised syllabus for technical education in plumbing classes, and a higher standard of test was to be introduced, both practically and theoretically, at examinations held by the Institute. Many of the defects in present-day plumbing were attributed to the interference of several self-constituted bodies and a host of examiners holding their certificates.

The Building Trade at Johannesburg.—During the past year the municipal authorities of Johannesburg passed plans for about £1,203,950 worth of new buildings. Here are the monthly figures :—

January	£173,298	February ...	£91,564
March	110,143	April	75,275
May	137,626	June	139,486
July	107,340	August	75,218
September ...	76,676	October	70,616
November ...	56,708	December (estimated)	90,000

The outlook in the building trade is hopeful.

The L.C.C. Works Department. — The Works Committee of the London County Council have prepared a statement in regard to the half-year ended September 30th last. The statement embraces 14 estimated works, the final estimates for which amounted to £175,570, while the actual cost was £161,315, leaving a balance of cost below final estimate of £14,255. Only in the cases of the erection for the Education Committee of four schools for defective children has the actual cost exceeded the final estimate. The jobbing works carried out by the department during the same period show a substantial saving on the schedule value. The expenditure on all works executed by the department during the half-year was £250,000. The committee draw attention to the financial results of the works executed by them since the existing constitution of the Works Committee was settled in 1902, and they consider that the figures now reported afford, apart from other considerations, ample justification for the policy of the Council with regard to the execution of works by the direct employment of labour.

The Month's Trade

Reports by our Special Correspondents.

THE CLAYWORKING INDUSTRY.

Of course we cannot expect the trade at this season of the year to be anything but dull. It remains very much the same in January as in December. Employment in the brick and tile trades continues slack at Peterborough, Ruabon, Wrexham and at Nottingham. At the last-mentioned town it is worse even than it has been of late. In Shropshire short time has been worked. In South Staffordshire and the Tees and Hartlepool district employment is moderate. In the Flint district it is steady and in Devonshire fairly good on the whole. In South Wales and at Oldham it is to be specially noted that trade continues good, although it is naturally slightly worse than it was a short while ago. On the whole there is nothing to despair of. The trade has been in a very slack state for a long while, it is true, but it is beginning to mend and there is every indication that in the spring the building trade will become much brisker than last year and that a time of prosperity will have again set in, which looks as though it might become quite a boom a year or two hence. If we glance at reports of the year's trade in the cotton and engineering industries, and indeed at the whole of our import and export trade, we see that there has been a wonderful revival that only needs time to have its accustomed reflection upon the building trade.

THE STONE, GRANITE, MARBLE, AND SLATE TRADES.

The weather in the past month has naturally resulted in slackening of employment in the quarries, but these have been exceptionally well employed for the time of year, partly owing to improved trade and partly due to the fact that the weather has been so mild. Before dealing specifically with the various branches of the quarrying and stone-working trades we can state generally that if we compare the statistics with previous years we see that stonemasons throughout the country were fairly employed, and that the quarries were well employed in the past month.

Employment in the limsetone quarries has continued good in South Durham and in Cumberland. At the quarries in Westgate and Upper Weardale it has been reported as fair, but work has been suspended for some time owing to severe weather. In North Wales it has been fair, though affected by the weather. In the Plymouth district it has been moderate. Employment has continued quiet in the Buxton district.

In the sandstone quarries in North Wales employment has been fair, but has been affected by severe weather. Employment in the Sheffield and Barnsley district has been quiet, bad weather causing interruption. In the building stone quarries in the Rowsley district employment has been moderate, with short time, and worse than a month ago. At Gateshead it has been bad, and much time was lost through bad weather. Employment has continued bad in the Bath stone quarries, in the Bistrol district, and in Forfarshire.

As regards the granite trade in North Wales employment has continued good, but has been affected by the severe weather. In Leicestershire it has been fair and better than a month ago. On Dartmoor employment has been slightly better than a month ago; but in the Penryn district it has been still dull. In Aberdeenshire employment has continued fair, but snow has caused the quarries to be closed for some time.

Employment has continued good, with overtime, in chert quarries in Derbyshire.

In the Clee Hill road-material quarries employment has continued fair.

With settmakers employment has continued good generally in North Wales, though interrupted by bad weather, and it has been fair in the Clee Hill district, at Edinburgh, and in Aberdeenshire. At Stoney Stanton (Leicestershire) it has continued dull. At Glasgow employment has also been dull, bad weather causing broken time; at Airdrie employment has been bad.

As regards Aberdeen, our correspondent reports that the granite polishers and the firms who supply axed and decorative granite for building purposes have been complaining of slack trade. It is hoped now that so many fine coloured granites have been put on the market that architects and others interested will specify freely. Polished plinths for buildings, especially in our large cities, should be more used than they are for obvious reasons, and there is no difficulty in supplying promptly out of stock. The depression in the sett trade continues and the signs of the times do not encourage the hope of a speedy revival. The outcry against the high rates levied by County and other Councils will no doubt have the effect of curtailing expenditure in tramway, street and road works, but we trust the high reputation of Aberdeen setts for endurance and non-slipperiness will determine surveyors to specify Aberdeen.

The output of the Guernsey quarries continues to be much in excess of the demand. Orders generally are coming forward far too slow and, consequently, stocks are not diminishing. Setts are being made principally for stock and only small parcels have been shipped during the month. We hope the demand in the near future will justify the present production. The demand for machine screenings is improving, but when the real value of this material becomes still better known trade should be very considerably increased in this particular branch, especially in the construction of concrete pathways, also in connection with reinforced concrete. Even glass-houses are being constructed in Guernsey of reinforced concrete instead of timber, and for strength and durability the manufacturers say they cannot be surpassed, while the cost is not in excess of timber; besides there is no periodical painting or upkeep needed, and the only fault is that such a construction will last for "ever."

As regards Norway, shipments of setts, curbs, &c., are rather small just now owing to a number of the ports being ice-bound, although an improvement over past years has been effected this winter by the employment of icebreakers. The trade in building work is slack but several small jobs are in hand. Messrs. A. and F. Manuelle, of 57, Gracechurch Street, have just completed the supply of their "Standard Grey" granite for the new "Morning Post" building in the Strand. The quantity for this important contract totalled over 40,000ft. cub. When it is realised how expeditiously this contract has been accomplished we feel sure this material will be more extensively used in the future.

The slate trade is without much movement. In North Wales employment has been affected by severe weather. There has been a slight improvement in the Festiniog district, and in Carnarvonshire employment has been reported as fair. At Ballachulish (Argyllshire) employment has continued dull.

We were somewhat surprised to hear it had been stated recently that the unfading green slates from the "Eureka" quarries were now unobtainable in this country, but Messrs. Roberts, Adlard & Co., who have represented the quarries for nearly half a century, assure us that this statement is erroneous and that they continue to carry appreciable stocks of these slates, though the large demand sometimes renders it impossible for them to have a stock of every individual size. From the same source we gather it is generally considered there are prospects of some improvement in the roofing slate and tile business for the current year, which would seem to be borne out by the fact of higher prices appearing on the quarry lists recently issued.

We call attention to a book which has recently been sent us, entitled "Owen's Slate and Tile Tables," compiled by Mr. O. Lloyd Owen and published by the Criterion Press, 38, Imperial Buildings, Ludgate Circus, London, E.C., and of Rutland Street, Leicester. This book should be very valuable to the slate and tile trades. It is intended to furnish useful information to those interested in these branches of the building trade, and more particularly to obviate the tedious calculations which are continually necessary whenever slates or tiles, slating or tiling, are involved. So far as we know this is the only publication of its kind. The arrangement of the tables is simple. The equivalent square prices are given in five different laps, 2-in., 2½-in., 3-in., 3½-in. and 4-in., but it has not been found expedient to give the square yard prices except for the 3-in. lap only, as the tables of equivalents will readily show the prices for the other laps. The range of prices will be found sufficiently extensive to meet any demand made on them. The quarries usually fix their prices in multiples of 2s. 6d., but should the equivalent of any intermediate figure be required it can be ascertained without difficulty. The tables relating to charges are based on computed weights, and should, therefore, be used with caution, as the actual weights might differ. For ordinary purposes, however, they will be found approximately correct.

The returns for imports of stones, slabs and marble, rough, hewn and manufactured, for the month of December, 1906, as compared with the same month in 1904 and 1905, are as follows:—

Tons.			Value.		
1904.	1905.	1906.	1904.	1905.	1906
86,865	108,437	84,707.	115,329	120,024	90,560

The returns for the whole of each year ended December 31st, are as follow:—

Tons.			Value.		
1904.	1905.	1906.	1904.	1905.	1906.
1,308,565	1,198,860	1,225,565	1,449,477	1,295,669	1,332,127

THE PORTLAND CEMENT TRADE

No movement of any importance has occurred in the Portland cement trade during the past month. As usual at this time of the year home trade is slack, but reports from every quarter indicate that the export demand continues exceptionally active. Everything points to a period of great activity and higher prices when the spring demand asserts itself, as it will assuredly do in a few weeks' time. The consumption of Portland cement is increasing in all countries by leaps and bounds, and it is now perfectly clear that in many foreign markets the local production is quite inadequate to cope with the calls upon it. One has only to look at the statistics of exports not only from this country but from Germany, Belgium and other Continental countries, to get confirmation of the view we have repeatedly expressed in these columns of the great growth in the demand and the increase in shipments to almost every market. Should this state of things continue—and of this there appears to be no doubt in the minds of those best able to form a reliable opinion—it is clear that prices must respond, and that they will reach a considerably higher level than is indicated by current quotations. It is unfortunate that the building trades in London and certain other important home centres continue dull, but assuredly the revival cannot be long delayed in face of the prosperity which is spreading throughout the whole country. There seems to be somewhat more activity in the contracting trades and several important contracts have been placed during the last month for work in South Wales and in the North-Eastern counties. A feature of interest is the announcement that the large building about to be erected by the General Post Office in London is to be built of reinforced concrete on the Hennebique system. All those interested in concrete work are naturally elated at the action of so important a Government department, for it is bound to give a much-needed fillip to the reinforced concrete industry in this country. Hitherto we have lagged considerably behind other countries such as France, Germany and the United States, but general interest has lately been aroused, and fair progress in this direction has been made during the last twelve months, though our natural conservatism has resulted in our progress being much slower than that of the countries named. It is scarcely necessary to point out that the certain development of this industry will result in a largely-increased demand for Portland cement of the best quality.

The exports of Portland cement from, and the imports into, the United Kingdom for last year—the figures of which are appended—disclose an eminently satisfactory position. Imports of the best quality artificial cement have now practically ceased, and although cheap Belgian natural product has substantially diminished in volume, too much of this doubtful material is still being used in this country if regard is to be paid to the stability of constructional work.

The Costa Rican Government have declared Partland cement free of Customs duty and wharfage charges from January 1st, 1907.

The returns of imports and exports of cement for building and engineering purposes for December, 1906, as compared with the same month in 1904 and 1905, and for the whole of each year ended December 31, are as follows :—

Imports.—Month.

	1904.	1905.	1906.
Tons -	- 14,494	13,456	10,841
Value -	- £20,129	16,918	14,194

Exports.—Month.

	1904.	1905.	1906.
Tons -	- 32,701	40,584	49,958
Value -	- £52,461	62,239	78,043

Imports.—Year.

	1904.	1905.	1906.
Tons -	- 272,945	234,588	172,110
Value -	- £393,145	300,342	221,772

Exports.—Year.

	1904.	1905.	1906.
Tons -	- 384,583	455,874	657,934
Value -	- £632,336	720,349	996,626

THE IRON AND STEEL TRADES.

The return for imports and exports in certain branches of manufactured iron and steel for the month of December, as compared with the same month in 1904 and 1905, and for the whole of each year ended December 31, are as follows :—

	Month.						Year.					
	Imports.			Exports.			Imports.			Exports.		
	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1605.	1906.
Puddled Iron - tons	10,050	12,133	7,462	61,029	65,122	167,008	133,734	129,039	90,846	810,949	983,306	1,667,431
Wrought iron, in bars, angles, rods and sections	8,134	14,979	7,508	9,714	10,363	12,525	104,242	105,960	107 713	115,636	134,309	151,052
Rails	3,263	1,128	945	50,818	36,452	24,122	39.801	33,897	11,713	525,371	546,569	463,243
Steel :—Girders, beams, joists and pillars from Belgium	5,277	10,423	3,564	6,330	5,028	8,289	96,044	96,523	91,816	50,205	63,965	107,382
" " " " other countries	1,310	2,450	2,936				26,910	26,475	46,844			
Ingots, blooms, billets, slabs, sheet bars, tin plate bars, or similar partly manufactured	31,584	71,813	28,000	215	696	1,735	522,706	603,949	486,029	4,255	8,594	11,736
Bars, angles, rods and shapes or sections	13,037	4,973	1,801	10,344	11,039	18,295	93,099	50.227	55,025	122,900	151,879	198,948
Galvanized sheets (flat or corrugated)	—	—	—	36,863	35,525	37,434	—	—	—	385,448	406,815	443,131

The month of January began with stagnation owing to the effect of the holidays. The pig-iron works were short of fuel due to this and the scarcity of wagons, while ironstone was in short supply. Indeed the shortage of material became so acute that production had to be curtailed and furnaces put on slack blast. The enquiries from Germany and the United States continue and the promise displayed at the end of last year seems likely to be fulfilled. Speculators for the whole of the month operating in Cleveland warrants caused prices to go up and down somewhat and hampered real business. The fall in prices has been considerable and continuous throughout the month. Makers are well supplied with orders and can resist the tendency to depreciate prices to a great extent, but they have found it necessary to come down. The stock in the public stores steadily diminishes, however, and trade is in a very healthy state, so that the depression can only be momentary. The intrinsic strength of the market is bound to make itself felt. The prices of fuel and raw materials rose sharply, especially coke, at the beginning of the month.

As regards manufactured iron and steel the month began slow in consequence of the holidays, but this quickly gave way to activity. The works are fully occupied and order books well filled. The price of bar iron advanced again and reached the highest point for six years. No doubt a good deal of this is due to the increased cost of pig-iron, but there is undoubtedly a much greater demand. The speculation in warrants has not affected the manufactred market.
manufactured market. The shipbuilding trade largely affects the price of manufactured iron, and as this seems to be waking up after a short slumber further increases in prices may be anticipated. The demand for joists is fair, which is a good sign as regards the building trade requirements.

Steel-frame buildings are becoming quite a common feature nowadays and this must have its effect when the building trade generally revives.

Earthquakes and Steel Buildings.—Writing to the "Times" on this subject, Mr. G. Tyrell McCaw says :—"The fact that the skyscrapers of San Francisco stood the terrible shocks, even in spite of the enormous deadweight of the exterior shell of masonry, proves incontestably that a steel building will withstand even great shocks. . . . What is obviously required is a framework of mild steel, resting on a braced steel platform only loosely attached to the site. No weights should be added to the structure over and above what are absolutely necessary; hence stonework must not be anywhere used. The house should be plastered outside with concrete on wire netting; the walls filled with insulating material; the roof flat and of reinforced concrete; and the amount of woodwork reduced to the minimum to prevent the spread of fire; finally the height should be limited so as not to exceed a certain low multiple of the base."

The Lancashire market for pig-iron has naturally been affected by the slump in warrants, but the manufactured iron and steel branch has been going strong.

The South Staffordshire manufactured iron market is prosperous. Values are unaffected by pig-iron fluctuations, and the demand is strong.

The North of England market has been chiefly concerned with the fluctuation in the price of pig-iron. The exports of pig-iron in January broke the record for any month. Most went to America, but this is argued to represent orders given some time ago, and not to show the present demand from abroad, which is said to have fallen off. Recent reports from the United States indeed have not been so reassuring and speculators have been able to depress prices. As with other centres, however, the prices and demand for manufactured iron and steel are excellent, and there seem no troubles ahead.

Scotland has been troubled much as other places over pig-iron, but the manufactured branch has suffered not at all.

As regards the foreign market Belgium and Germany promise to continue busy and likely to leave the English market alone except for demands on our pig-iron. America is taking a good deal of pig from Middlesbrough, but the latest reports suggest that this will slacken off shortly.

OTHER METALS.

The "Engineering and Mining Journal" (New York) publishes the following table, summarising the estimated production of minerals and metals in the United States in 1906:—

Product.	Unit.	1905.		1906.	
		Quantity.	Value.	Quantity.	Value.
			Dollars.		Dollars.
Iron ore	Long ton (*b*)	44,578,456	94,768,122	49,670,000	103,570,000
Petroleum	Barrel	139,728,839	118,769,513	131,061,505	96,593,274
Phosphate rock	Long ton	1,933,286	9,713,296	2,102,067	10,552,376
Pyrites	,,	200,280	651,796	204,896	77,600
Copper sulphate	Pound	52,278,996	2,352,555	48,534,129	3,009,106
Copperas	(*a*) Short ton	21,103	147,721	18,546	129,822
Lead, sublimed white	,,	6,977	697,700	8,000	8,000,000
Zinc, oxide	,,	65,403	5,232,240	68,549	5,483,920
Zinc-lead, white	,,	7,200	540,000	5,749	488,665
Aluminium	Pound	11,350,000	3,632,000	14,350,000	5,166,000
Copper	,,	871,634,245	136,837,860	915,000,000	178,699,500
Iron, pig	Long ton	22,702,397	377,540,862	25,521,911	490,275,910
Lead	Short ton	319,744	30,133,490	364,336	38,962,092
Zinc	,,	201,748	23,733,635	225,395	27,939,964

(*a*) Short ton = 2,000lbs.; (*b*) Long ton = 2,240lbs.

The copper market remains strong. At the beginning of January prices were very high and established records, but towards the latter end of the month values fell off slightly—a fact which did not seem to increase the demand, as one would expect. The shortage in supply it is expected will remain for this year, though efforts are being made everywhere to increase output.

The tin market was at first not so active, though of late there has been a hardening tendency evident. It is impossible to predict what will happen with any certainty, even for a short while ahead.

Lead prices remain fairly even. There seems to be nothing much happening in this market.

THE IRONMONGERY TRADES.

At Wolverhampton and Willenhall employment in the lock and latch trades has continued bad. It has been good with hollow-ware workers at Wolverhampton; quiet with hollow-ware makers at West Bromwich; fair with hollow-ware stampers at Sheffield.

In the stoves, grates, &c., trades employment has been moderate at Rotherham; quiet at Leeds; fair at Glasgow; bad at Falkirk.

With nut and bolt makers employment has been fair at Birmingham, good at Dudley and Darlaston. At Birmingham it has been fairly good with nail makers, good with shoe rivet makers. At Blackheath it has been good with nut, bolt, rivet and frost nail makers.

Employment with wire workers has continued good generally.

The returns for imports and exports for December, 1906, as compared with the same month in 1904 and 1905, and for the whole of each year ended December 31, are as follows:—

IMPORTS.

	Month.						Year.					
	Tons.			Value.			Tons.			Value.		
	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.
Wire nails	2,934	3,654	2,872	£28,651	37,850	29,011	31,621	38.348	41,634	£324,864	385,321	425,214
Nails (other than wire nails), screws and rivets	1,028	1,119	714	19,431	19,655	12,052	13,450	12,575	9,647	217,693	220,072	163,461
Bolts and nuts	333	404	218	5,932	5,964	4,037	4,885	4,554	4,891	77,279	71,612	81,377

EXPORTS.

	Month.						Year.					
	Tons.			Value.			Tons.			Value.		
	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.
Nails, screws and rivets	1,802	2,044	2,545	35,970	39,435	41,935	21,473	24,647	29,460	426,933	465,995	515,964
Bolts and nuts	1,441	1,606	1,850	24,735	29,416	34,620	15,515	18,569	22,479	267,169	325,238	406,818

THE GLASS TRADE.

The glass trade continues fairly good. With sheet glass makers and flatteners at St. Helens employment has continued good. Glass bevellers at Birmingham have been fairly employed. Pressed glass makers on the Tyne and Wear have been working short time.

THE WALLPAPER TRADE.

The wallpaper trade continues much the same. The Board of Trade returns for exports and imports for the whole of last year show that the importation of paper-hangings was about 17 per cent. greater in value than in the previous year; the exports have also improved—namely, about 3 per cent. better than 1905. This ought not to be; it certainly seems to warrant the statement that the wallpaper combine is receiving real competition from abroad as well as from English manufacturers. The fact that the Combine is now pushing a distemper of their own manufacture is significant.

THE WALLPAPER TRADE.

The following is the return of paper-hangings issued by the Board of Trade for December and for the whole of each year ending December 31:—

IMPORTS.

	Month.			Year.		
	1904.	1905.	1906.	1904,	1905.	1906.
Cwts.	—	6,536	7,222	—	48,363	56,951
Value	—	£17,890	17,251	—	£133.118	155,739

EXPORTS.

	1904.	1905.	1906.	1904.	1905.	1906.
Cwts.	4,891	7,360	6,046	81,683	84,225	88,799
Value	£14,146	18,137	15,086	£204,241	208,861	214,224

THE GLASS TRADE.

The returns for imports and exports of glass for the month of December, 1906, as compared with the same month in 1904 and 1905, and for the whole of each year ending December 31, are as follows:—

IMPORTS.

	Month.						Year.					
	Cwts.			Value.			Cwts.			Value.		
	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.
Window and German Sheet, including shades and cylinders	65,385	143,573	121,887	£38,687	82,206	66,247	1,080,752	1,235,010	1,389,181	£622,367	725,747	778,185
Plate	36,390	26,483	25,930	42,487	35,575	33.029	477,625	419,588	390,408	563,952	516,796	508,899

EXPORTS.

	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.
Plate	11,916	7,584	9,711	16,261	11,615	16,627	85,080	118,011	139,395	123,256	165,922	206,764

THE PAINT TRADES.

The paint trades continue fair. As regards materials, the returns for imports and exports for December, 1906, as compared with the same month in 1904 and 1905, and for the whole of each year ended December 31, are as follows:—

IMPORTS.

		MONTH.						YEAR.					
		Quantity.			Value.			Cwts.			Value.		
		1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.
White lead	Cwts.	24,244	25,502	20,084	£19,359	21,423	19,203	310,280	306,113	283,371	£246,825	250,703	259,749
Zinc oxide		157,929	38,394	21,508	96,072	36,782	24,189	1,593,341	288,384	278,441	1,096,594	282,858	302,215
Other colours and pigments			132,595	133,455		70,424	69,344		1,481,881	1,622,056		900,184	944,935
Turpentine		38,653	35,801	25,767	67,698	78,547	53,590	528,112	526,679	512,836	1,006,369	1,104,300	1,076,870
Lac-dye, seedlac, shellac and sticklac		18,524	8,360	6,554	185,938	70,591	61,962	150,602	99,862	82,290	1,410,235	756,365	767,258
Linseed oil	Tons	80	2,276	1,668	1,247	40,723	35,308	3,136	9,117	18,661	55,784	163,700	375,099

EXPORTS.

		1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.	1904.	1905.	1906.
White lead	Cwts.	25,577	27,171	29,655	24,577	27,498	34,979	313,893	349,912	396,352	303,022	339,502	428,126
Zinc oxide		100,975	6,185	9,290	133,682	7,106	11,111	1,362,726	61,980	88,280	1,702,744	73,140	106,141
Other colours and pigments			100,246	116,473		130,976	137,049		1,375,093	1,462,480		1,755.345	1,894,945
Linseed oil	Tons	2,318	1,652	1,794	41,029	34,344	43,274	34,112	29,099	24,410	641,359	558,187	564,968

Manchester Notes

(*By our Own Correspondent.*)

Some schemes of more than average importance are on foot in this district and a good year for the building trade seems assured. During last year a considerable influx of stonemasons and other operatives continued; the new infirmary, new warehouses and schools, railway extensions and a large amount of new house property in the suburbs making a welcome contrast to the slackness of trade unfortunately prevalent in the Midlands. The almost phenomenal prosperity of the cotton trade during the last three years is having its effect throughout the district.

As the new infirmary makes rapid progress interest deepens in the question of the future of the old site in Piccadilly. It is more than probable that the proposal to erect a new art gallery and library will be carried out. The proposed new town hall for Salford is still under discussion, but the impossibility of any satisfactory addition to the old building seems to be generally admitted. It has been decided to rebuild the Manchester Y.M.C.A., which occupies a fine position at the corner of Mount Street and Peter Street, opposite the Midland Hotel. The first suggestion was to sell the present building and site and build elsewhere upon cheaper ground, but this has been found to be impracticable. It is estimated that £40,000 will be required, and towards this amount £14,000 has been subscribed.

If it is satisfactory to the ratepayers, the forward policy of the Lancashire and Manchester education authorities will assuredly meet with no opposition from the building trade. To the building of new primary schools there is no end, and now the Manchester committee has unanimously recommended the purchase of thirty acres of the Platt estate at Rusholme, for the provision of training colleges for men and women students and for the necessary recreation ground, at an estimated cost of £100,000. The committee also unanimously proposes a large new secondary school for girls in Chorlton Street, to relieve the congestion at the Whitworth Street School.

A syndicate of Manchester men has taken, on a ten years' lease, the Botanical Gardens at Old Trafford, which are to be converted into a kind of Earl's Court. Messrs. Charles Heathcote and Sons are the architects, and the estimated cost is £40,000.

A society, entitled The Manchester Tenants, Ltd., with a capital of £20,000, has secured a pleasant estate at Burnage for a co-operative garden city.

The tenders for Mr. Waterhouse's large addition to the Refuge Assurance premises in Oxford Street are to be in by February 11th. It is stated that the p. c. items amount to £100,000.

An addition to the Eye Hospital is being made at a cost of £20,000.

One of the most important of recent property sales will take place on February 12th, when the Royal Hotel and some warehouse and office property at the corner of Market Street and Mosley Street will be offered. Shops and offices will probably replace the present antiquated buildings. No finer site for this purpose exists in the city. With good hotels Manchester is already well supplied.

New Companies.

Bolton Stone, Concrete & Asphalt Co., Dawes Street, Bolton. Capital: £3,000.

Roman Brick Co., to acquire the inventions of F. L. Schauermann, 76, Cheapside, E.C. Capital: £20,000.

E. Brown & Son, builders, contractors, sawmill proprietors, &c., Castle Street, Wellingborough. Capital: £20,000.

Wandsworth Lime & Cement Co., to take over the business carried on at Frogmore Wharf, Wandsworth, and to adopt an agreement with W. Bishop. Capital: £3,000.

J. Charnock & Sons, to acquire the business of timber merchants and contractors, &c., carried on by G. Charnock at Queen's Road, Halifax, and elsewhere. Pellon Lane, Halifax. Capital: £7,000.

D. R. Paterson, to take over the business of a contractor and builders' merchant carried on at Bewlay Cliff Wharf, 32, St. James' Street, Camden Town, and 117a, Walmer Road, Notting Hill. Capital: £3,000.

Partnerships

[*The date when the partnership was dissolved is given in parenthesis where known.*]

Pollard & Brand, builders and contractors, London. (Dec. 31).

Dyson & Armitage, painters and decorators, Skelmanthorpe (Jan. 10).

Marston Bros. & Co., painters, paperhangers and plumbers, Shrewsbury (Dec. 31).

T. Wood & Sons, engineers, contractors, &c., Crockenhill and Sevenoaks (Oct.).

H. G. Stevens & Co., timber merchants, Reading (Sept. 1). Debts by H. G. Stevens.

Harrison & Lutley, builders and contractors, Walkden (Dec. 31). Debts by J. Lutley.

Hukins & Mayell, architects and surveyors, London (June 30). Debts by A. Y. Mayell.

Saunders & Mulcock, builders and decorators, London, N. (Dec. 31). Debts by J. Saunders.

W. Mallinson & Co., timber and veneer merchants, London (Dec. 31 as regards J. Richardson).

Bolton & Mawson, plasterers and contractors, West Hartlepool (Jan. 16). Debts by E. Hayward.

Woods & Moir, engineers and contractors, London, S.W. (Dec. 31). Debts by R. C. S. Woods.

Merrison, Garrood & Harrison, architects, surveyors, &c., London (Dec. 31). Debts by T. M. Garrood.

Allen & Scott, painters and decorators, Ashton-upon-Mersey (Jan. 11). Debts by E. C. Scott, who continues.

Mosedale Bros., joiners, builders, &c., Derby (Jan. 1). Debts by T. Mosedale, H. Mosedale, and J. Mosedale.

D. Doughty & Sons, builders and contractors, Middlesbrough (Dec. 31). Debts by H. & W. G. Doughty, who continue.

Dickinson & Metcalfe, builders and contractors, Harrogate and Redcar (Dec. 22). Debts by J. Metcalfe, who continues.

Lemon & Blizard, architects and surveyors, Southampton, Salisbury and London (Dec. 31). J. H. Blizard continues.

W. Mortimer & Son, architects and surveyors, Lincoln and Romford (Dec. 31). Debts by W. M. Mortimer, who continues.

Lynham, Beckett & Lynham, architects, Stoke-upon-Trent and Longton (Jan. 1). Debts by C. Lynham at Stoke, who continues as Lynham & Son, and by J. H. Beckett at Longton, who continues in his own name.

The Labour Market

Board of Trade Returns for December.

Employment in the building trades continued dull during December. It was worse on the whole than in November, and showed little general change compared with December, 1905.

Returns received from firms employing 51,408 workpeople at the end of December showed a decline in the numbers employed of 4,870, or 8·6 per cent., compared with November. These figures, however, were affected to some extent by the Christmas holidays, and also by the severity of the weather.

The following table summarises the returns received:—

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Workmen.	Labourers.	Lads and Boys.	Total.
London	10,025	7,181	682	17,888
Northern Counties and Yorkshire ...	2,898	2,872	641	6,411
Lancashire and Cheshire	3,792	2,847	1.080	7,719
Midlands and Eastern Counties...	3,213	2,489	499	6,201
S. & S.W. Counties and Wales	2,867	2,044	560	5,471
England & Wales ...	22,795	17,433	3,462	43,690
Scotland	2,995	1,878	904	5,777
Ireland	886	925	130	1,941
United Kingdom ...	26,676	20,236	4,496	51,408

From the above table it will be seen that there was a decrease of 9·5 per cent. in the case of skilled workmen, and of 8·8 per cent. in the case of labourers. In the London district the decrease in the total number (including lads and boys) amounted to 10·1 per cent.

Employment was dull in most branches of the building trades, but in Scotland it was reported as fair by plumbers and plasterers, and as good by slaters, being better than a month ago in each case. Slaters in England reported employment as moderate. Compared with November carpenters and joiners showed a decline in employment, but no general change was reported by bricklayers, masons and painters. Compared with a year ago, carpenters, plumbers and slaters reported an improvement, and painters in Scotland and masons reported a decline, while bricklayers and plasterers reported no general change.

The percentage unemployed of Trade Union carpenters and joiners in the United Kingdom at the end of December was 8·6, as compared with 6·9 in November, and 9·6 a year ago. The percentages unemployed of Trade Union plumbers for the same periods were 7·5, 6·9 and 10·5 respectively.

London.

Employment was dull generally. From Trade Union returns relating to carpenters and joiners in the London district it appeared that 9·8 per cent. were unemployed at the end of the month, against 8·2 in November, and 10·0 a year ago. For plumbers the percentages were 12·5, 11·9 and 14·2 respectively. Masons and painters reported employment as worse than a year ago, while bricklayers reported no general change compared with either a month ago or a year ago.

The Provinces.

Northern Counties and Yorkshire.—Employment was dull generally except with slaters, who were fairly well employed.

Lancashire and Cheshire.—Employment was dull on the whole.

Midland and Eastern Counties.—Employment was slack generally.

Southern and South-Western Counties and Wales.—Employment continued dull generally.

Scotland.—Employment was quiet generally.

Ireland.—Employment was dull generally, except with plumbers, who were fairly well employed.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen	8	—	8	8	8	8	8	4½–5
Accrington	9	9	8½	9	7½	8½	—	5–5½
Ashton-under-Lyne	9½	10	9	10	8¼	9	8½	5½–6½
Barnsley	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness	9	9	8¾	9	9	8¼	8¼	6–6½
Bath	7½	7½	7½	7½	7½	6½ 7½	6½	5–5½
Belfast	8½	8½	8½	8¾	8	8½	8½	19s.wk
Birkenhead	9½–10	9½	9½	9½	9	—	8½	5–6½
Birmingham	10–10¾	9½	9½	10	9	9½	8½	6½–7
Blackburn	9½	10	9	9	9	9	8	5½–6½
Blackpool	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton	9½	10	9½	10	9	9	8½	6–7
Bournemouth	8	8	8	8	8	8	7½	5½
Bradord	9	9	8½	8½	9	9	8	6–6½
Brighton	9	8	8	8	8	9	7	5½
Bristol	9	9	9	9	9	9	8½	6
Burnley	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury	9½	10	9½	9	9	9	8½	5–6½
Cambridge	8½	8	8	8½	8	8½	6½	5–5½
Cardiff	9	9	9	9	9	9	8½	5½
Carlisle	8½	8½	8	8	9	8	8	5–5½
Chatham	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie	9½	9½	9	9½	9	8½	9	6
Colchester	8	8	8	9	8	9	6 6½	5–5½
Cork	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3⅝
Coventry	9½	8¾	9	9	9	9	8	6
Crewe	8½	8	7	9	8	8	7	5–6
Darlington	9	9	8½	9	9½	8	7½	6
Darwen	9½	9½	9	9	9	9	8¼	6
Derby	9	9	8½	9	9	8½	7½	5½–6
Dublin	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley	8½	8	8	8½	8	8	7	5½
Dundee	8½–9	10	9	8½	8½	9	8½	5¼–5½
Eastbourne	8½	8	8	9	pce.	8	7½	5½
Edinburgh	8½	9½	9	—	—	9	—	—
Exeter	8	8	7½	7½	7½	7½	6½	5
Glasgow	—	9½	10	9½	9	9	9	5½–6
Gloucester	7½	8	8	7½	7½	8	7½	5
Greenock	9½	10	9	9½	9½	9	9	5½
Grimsby	—	9	8	9	pce.	—	7½	6–7
Halifax	9	9	8¼	8½	8½	8½	7½	6
Hartlepools	9½	9	9½	9½	—	—	—	6½–7½
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield	9	9	8½	8½	9	7½ 8	7½	6
Hull	9¼–9¾	9	9	9	9	9	8	6½–7
Ipswich	8	8	8	9	9	8	6½	5½
Keighley	8½	8½	8	7½	8½	7½	7½	6
Lancaster	9½	10	8½	9	9	8½	8½	5½–6
Leeds	9½	9½	9	9½	9	9	8	6½–7
Leicester	9	9	9	10	9	9	8	6½–7
Leigh	9½	9½	9½	9	8½	9	8	6–6½
Lincoln	8½	8	8	9	8	8	7	5–6
Liverpool	9½–10	9½	9½	9½	9½	9½	8½	5–6
London	10½	10½	10½	11	—	11	—	—
Londonderry	7	7	7	7	6½	7	7½	15s.wk.
Macclesfield	8	8	8	7¾	6½	7½	7½	5
Manchester	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	9½	9	8	6¼–6¾
Newcastle	9½	9	9½	9½	9½	9	8½	6¼
Newport (Mon.)	8½	8½	8½	8½	8½	8½	7½	5½
Northampton	8½	8½	8½	8½	—	8½	7½ 8	5½
North Shields	9½	9½	9½	9½	9½	9	9	6¼–6½
Norwich	9	9	8½	9	9	8½	7½	5–6
Nottingham	9½	9	9	10	9	9	8½	6½
Oldham	9½	10	9½	9	8½	9	8½	5½–7
Oxford	8½	8	8	8	8	9	7	5½
Paisley	9	9½	9	9½	9	9½	9	6
Perth	8	10	8	8	8	8	7½	5½–6
Plymouth	8	8	8	8	8	8	7	5
Portsmouth	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham	9½	9½	8½	8½	8	8½	7½	6
St. Helens	9	9	9	9	9	8½	8¼	5½–6
Scarborough	8½	8½	8	8½	30s. wk.	8	7½	6
Sheffield	9½	9½	9	9	9	9	7½	5½–6½
Southampton	7½	8	8	8	pce.	8	7	5
Southport	9	9	8¾	9	9	9	8½	6
South Shields	9½	9½	9½	9	9½	8¾	8½	6¼
Stockport	9½	9½	9	10	9	9	—	6–7
Stockton-on-Tees	9	9½	9¼	9½	9½	9	8	6¼–6½
Sunderland	9½	9½	9¼	9½	9½	37s. wk.	9	6¼
Swansea	8½	—	8½	8½	—	8½	7½	5½
Torquay	7	7	7½	7	7	7	7	4½–5
Wakefield	9	8½	8	8½	8	7½	7½	6
Walsall	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington	8¾	9¼	9¼	9½	8½	9¼	—	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan	9½	10	9	9	8½	9	8½	5½–7
Wlverhampton	9	9	9	8½	8½	9	7½	6–6½
Worcester	8½	8½	8½	8½	8½	8½	7	5½
Yarmouth	7½	7½	7½	A	7½	7½	6	4½

A. Done by bricklayer.

Current Market Prices.

FORAGE.

		£ s. d.	£ s. d.
Beans	per qr.	1 10 0	1 12 0
Clover, best...	per load	4 7 0	4 17 6
Hay, good	do.	4 0 0	4 5 0
Sainfoin mixture	do.	4 0 0	4 7 6
Straw...	do.	1 8 0	1 14 0

MISCELLANEOUS.

Bricks Stocks, d/d to job	per 1,000	1 16 0	—
Do. Flettons on rail ...	do.	1 6 0	—
Do. Pressed Wire Cuts, d/d to job ...	do.	1 18 0	—
Do. Blue brindled wire cuts	do.	1 3 0	—
Do. do. wire cuts ...	do.	1 7 0	—
Do. do. pressed facings	do.	1 18 0	—
Coke Breeze, into carts at gasworks ...	per load	0 2 0	—
Do. d/d to job	do.	0 4 0	—
Sand	per yard	0 7 6	—
Ballast	do.	0 6 6	—
Cement	per ton	1 12 0	—
Lime	do.	1 4 0	—
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds	per sq. ft.	0 0 3½	—
Do. do. do. do. 3rds.	do.	0 0 2½	—
Do. do. do. 21oz., 2nds.	do.	0 0 5	—
Do. do. do. do. 3rds	do.	0 0 3½	—
Do. do. do. 26oz., 2nds	do.	0 0 6	—
Do. do. do. do. 3rds	do.	0 0 4¼	—
Do. do. do. 32oz., 2nds	do.	0 0 8	—
Do. do. do do. 3rds	do.	0 0 6	—
Castor Oil, French ...	per cwt.	1 9 0	—
Colza Oil, English ...	do.	1 11 6	—
Copperas	per ton	2 0 0	—
Lard Oil	per cwt.	2 15 0	2 17 0
Lead, white, ground, carbonate	per ton	16 0 0	—
Do. red	do.	15 0 0	19 0 0
Linseed Oil, barrels ...	per cwt.	1 2 1½	—
Petroleum, American ...	per gal.	0 0 6¾	0 0 6⅞
Do. Russian ...	do.	0 0 6¼	0 0 6⅜
Pitch	per barrel	0 12 0	0 13 0
Shellac, orange	per cwt.	10 13 0	10 14 0
Soda, crystals	per ton	3 2 6	3 5 0
Tallow, Town	per cwt.	1 13 0	1 15 0
Tar, Stockholm	per barrel	1 5 0	—
Turpentine	per cwt.	2 12 0	—

METALS.

Standard Copper	per ton	106 0 0	106 10 0
Do. Strong sheets ...	do.	123 10 0	124 0 0
Lead, soft foreign	do.	19 12 6	19 15 0
Do. English	do.	19 15 0	20 0 0
Do. pipes...	do.	22 15 0	23 0 0
Do. sheets	do.	23 0 0	23 5 0
Galvanised Corrugated sheets	do.	14 0 0	14 2 6
Spelter G. M.	do.	27 0 0	27 5 0
Angles, Scotland	do	7 0 0	7 5 0
Bars, do.	do.	7 15 0	8 0 0
Marked bars, Staffs. ...	do.	8 17 6	9 0 0
Common bars, do. ...	do.	7 5 0	7 10 0
Angles, M'boro.	do.	7 0 0	7 2 6
Joists do.	do.	6 12 6	6 15 0
Angles, Midlands	do.	7 0 0	7 2 6
Joists do.	do.	7 2 6	7 5 0
Girder plates, Midlands ...	do.	7 17 6	8 0 0
Angles, Foreign, c.i.f. Thames	do.	7 13 6	7 15 0
Tees do. do. do.	do.	7 16 6	7 18 6
Joists, do. do. do.	do.	6 7 6	6 10 0
Channels do. do. do.	do.	6 10 0	6 15 0
Plates do. do. do.	do.	7 10 0	7 12 6
Tin, Foreign	do.	190 0 0	191 0 0
Do. English ingots ...	do.	190 0 0	191 0 0
Zinc, sheets, Silesian ...	do.	31 10 0	32 0 0
Do. do. V.M. ...	do.	31 10 0	32 0 0

TIMBER.

SOFT WOODS.

		£ s. d.	£ s. d
Deals, Archangel, Yellow, 3rd, 2×9	per std.	11 0 0	—
Do. do. do. do. 2×9	do.	10 5 0	—
Do. Brakestad, Yellow, unsorted, 2×5½	do.	8 15 0	—
Do. do. do. do. 2×5	do.	9 0 0	—
Do. do. do. do. 2×4½	do.	8 15 0	—
Do. do. do. do 2×3½	do.	8 10 0	—
Do. do. do. do. 2×3	do.	9 10 0	—
Do. Fredriksstad, White, 1st and 2nd, 1×9	do.	11 10 0	—
Do. do. do., 3rd, 1×9	do.	10 10 0	—
Do. do. do. unsorted, 2×4	do.	8 0 0	8 5 0
Do. do., Yellow, unsorted, 2×4	do.	9 5 0	—
Do. Gamleby, Yellow, unsorted, 2×4	do.	9 5 0	—
Do. Hallsta, Yellow, unsorted, 2×4½	do.	8 10 0	—
Do. Kola, Yellow, unsorted, 2×6	do.	9 15 0	—
Do. Kovda, Yellow, 4th, 1×9	do.	9 15 0	—
Do. Lappvik, Yellow, unsorted, 2×5	do.	8 15 0	—
Do. do. do. do. 2×4	do.	9 10 0	—
Do. do. do. do. 2×3	do.	9 5 0	—
Do. Onega, White, 2nd, 2×8	do.	9 10 0	—
Do. do. do. do. 2×7	do.	9 5 0	—
Do. Raumo, Yellow, unsorted, 2×4	do.	9 10 0	—
Do. St. Petersburg, White, 3rd, 2×6½	do.	7 15 0	—
Do. do. do. do. 2×7	do.	8 10 0	—
Deals, St. Petersburg, White, 3rd, 2×5	per std.	7 15 0	—
Do. do., Yellow, 3rd, 2×6	do.	8 10 0	—
Do. do. do. do. 1¼×7	do.	8 15 0	—
Do. do. do. do. 2×5	do.	8 10 0	—
Do. Sundswall, White, unsorted, 2×4	do.	8 15 0	--
Do. Stugsund, Yellow, 3rd, 1½×9	do.	10 0 0	—
Do. Trangsund, Yellow, unsorted, 2×3½	do.	8 15 0	9 15 0
Do do. do. do. 2×3	do.	9 5 0	—
Flooring Boards, Batskarsnas, Yellow, 3rd, 1×8	do.	0 9 6	—
Do. do. do. do. 1×6	do.	0 9 6	—
Do. Fredriksstad, Yellow, unsorted, 1×6	do.	0 9 9	—
Do. Sundswall, Yellow, 1st, 1¼×6	do.	0 14 6	—
Do. do. do. do. 1×6	do.	0 11 9	—
Do. do. do. 2nd, 1¼×6	do.	0 13 9	—
Do. do. do. do. 1×6	do.	0 11 0	—
Do. do. do. 3rd, 1×6	do.	0 10 0	—
Do. Soderhamn, Yellow, 2nd, 1¼×6	do.	0 13 6	—
Do. Wifstawarf, Yellow, Sup. 1st & 2nd 1×6½	do.	0 11 0	—
Battens, Archangel, White, 2nd, 3×9	do.	9 15 0	10 0 0
Do. do. Yellow, 4th, 3×7	do.	9 0 0	—
Do. do. Yellow, unsorted, 3×9	do.	9 15 0	—
Do. Brakestad, Yellow, unsorted, 3×4½	do.	9 0 0	—
Do. do. do. do. 3×3½	do.	8 10 0	—
Do. Fredriksstad, Yellow, 4th, 3×9	do.	10 10 0	—
Do. do. do. 5th, 3×9	do.	9 15 0	—
Do. do. do. unsorted, 3×8	do.	9 15 0	—
Do. Fingermanholmen, White, unsorted, 3×4½	do.	7 15 0	—
Do. Gefle, Yellow, 5th, 3×9	do.	7 10 0	—
Do. do. do. do. 2½×7	do.	8 5 0	—
Do. Granvik, Yellow, 3rd, 3×5	do.	7 15 0	—
Do. Haparanda, Yellow, 1st, 3×4½	do.	9 10 0	—
Do. do. do. 2nd, 3×4½	do.	9 0 0	—
Do. Horneborg, Yellow, unsorted, 3×5½	do.	8 10 0	—
Do. do. do. do. 3×5	do.	8 10 0	—
Do. do. do. do. 3×4½	do.	8 15 0	—
Do. Kovda, Yellow, 3rd, 3×9	do.	11 0 0	—
Do. do. do. 4th, 4×9	do.	9 15 0	—
Do. Keret, Yellow, 2nd, 3×9	do.	14 0 0	—
Do. Kola, Yellow, unsorted, 3×11	do.	10 10 0	10 15 0
Do. do. do. do. 3×8	do.	10 0 0	—
Do. do. do. do. 3×7	do.	10 0 0	—
Do. do. do. do. 2½×8	do.	9 15 0	—
Do. do. do. do. 2½×7	do.	10 0 0	10 5 0
Do. Lappvik, Yellow, unsorted, 3×2	do.	9 5 0	—
Do. Montreal, Red Pine, 1st, 3×9	do.	14 10 0	—
Do. do. do. do. 3×7	do.	12 15 0	—
Do. Montreal, Red Pine, 2nd, 3×9	do.	10 15 0	—
Do. do. do. do. 3×7	do.	9 15 0	—
Do. Nederkalix, Yellow, 1st, 4×9	do.	12 10 0	—
Do. do. do. do. 3×9	do.	11 10 0	—
Do. do. do. do. 2½×9	do.	12 0 0	—
Do. do. do. 2nd, 4×7	do.	9 5 0	—
Do. Onega, White, 2nd, 3×11	do.	11 10 0	—
Do. do. do. do. 3×9	do.	10 5 0	—
Do. Petschora, Yellow, 3rd, 3×9	do.	11 0 0	—
Do. Quebec Spruce, 3rd, 3×9	do.	9 15 0	—
Do. do. do., 4th, 3×9	do.	9 5 0	—
Do. Riga, White, 2nd, 3×9	do.	8 5 0	—
Do. do. do. do. 3×7	do.	8 0 0	—
Do. Storfors, Yellow, 5th, 3×9	do.	9 0 0	—
Do. St. Petersburg, Yellow, 3rd, 3×9	do.	9 0 0	—
Do. do. do. do. 3×7	do.	8 15 0	—
Do. do. White, 3rd, 3×7	do.	8 5 0	—
Do. do. do. do. 2½×7	do.	8 15 0	9 0 0
Do. do., Yellow, unsorted, 3×9	do.	8 10 0	—

HARD WOODS.

Ash, Quebec	per load	4 5 0	7 7 6
Birch, New Brunswick ...	do.	2 0 0	4 10 0
Do. Quebec	do.	2 0 0	4 10 0
Box, Turkey	per ton	6 0 0	20 0 0
Cedar, Cuba	per ft. sup.	0 0 4½	0 0 6
Do. Honduras	do.	0 0 4½	0 0 5½
Do. Tobasco	do.	0 0 5⅝	—
Elm, Quebee	per load	4 0 0	8 5 0
Jarrah, planks	per ft. cu.	0 2 6	0 3 0
Mahogany, Average Price for Cargo, Honduras	per ft. sup.	0 0 4½	0 0 5½
Do. Tobasco ...	do.	0 0 4	0 0 5½
Do. Cuba ...	do.	0 0 4½	0 0 5½
Do. African ...	do.	0 0 3½	0 0 5½
Do. Lagos ...	do.	0 0 3½	0 0 5½
Oak, Wainscot	per log	2 5 0	6 0 0
Teak, Indian, logs ...	per load	9 5 0	19 10 0
Do. do. planks ...	do.	13 15 0	20 10 3
Whitewood, American, logs	per ft. cu.	0 1 3	0 1 6

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March 6, 1907.
CONTRACTORS' SUPPLEMENT (MONTHLY).

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THE PICCADILLY HOTEL.

We give on this page a view of the Quadrant front of the new Piccadilly Hotel. This forms part of the scheme shown in Mr. Norman Shaw's design for the rebuilding of the Quadrant, which has attracted so much attention, more particularly on account of the treatment of the shop windows: from the view given it will be seen how these have been treated. The hotel is now beginning to bulk up largely, the work being at present at second-floor level. The fronts are being carried out entirely in Portland stone. Special attention is drawn to the colonnade, comprising a series of massive coupled columns with Ionic capitals. In previous "Contractors' Supplements" we have given views showing the excavation of the site and the erection of the lower part of the hotel, and it will be seen from these how very extensive the building is.

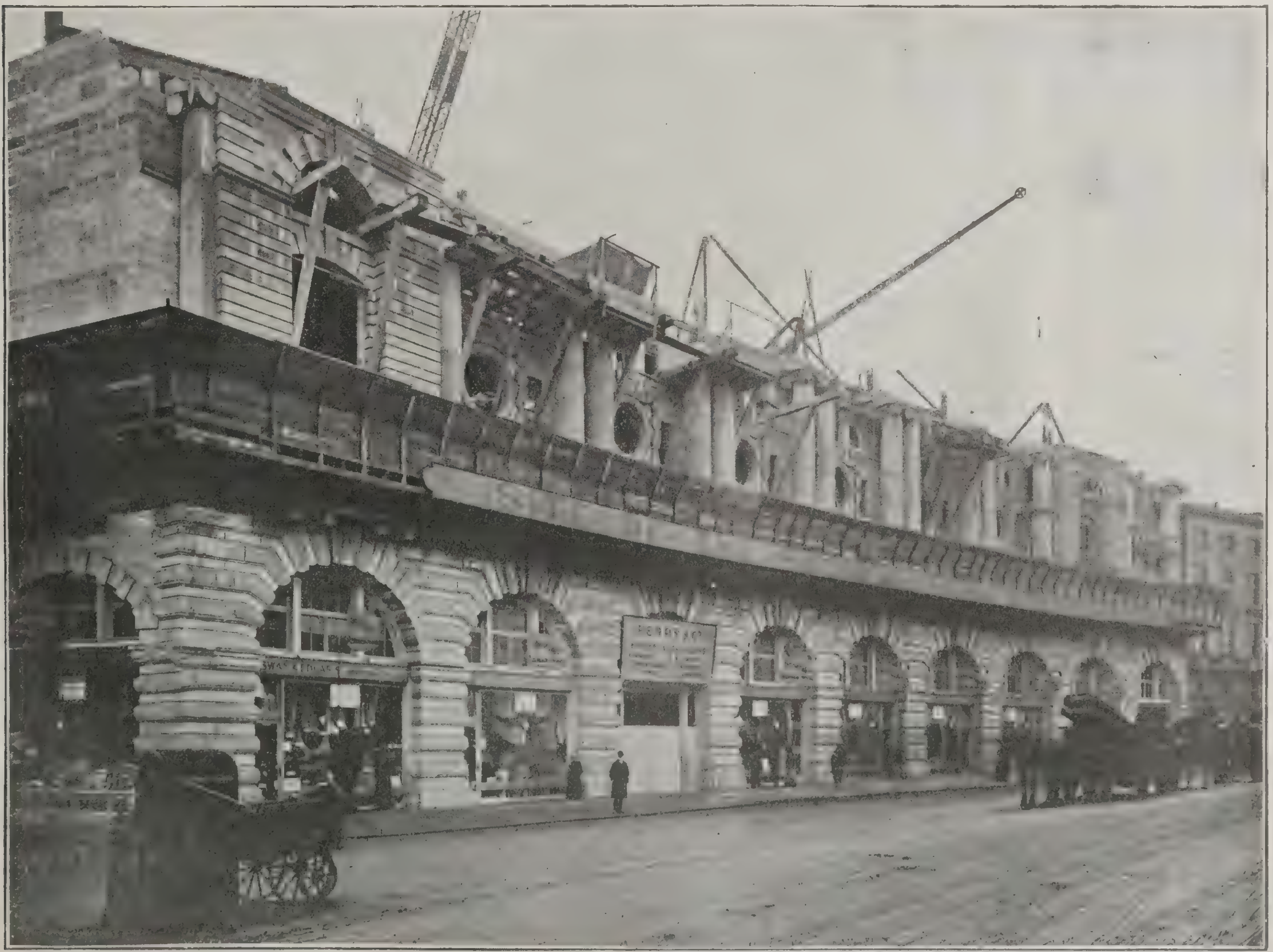
In the basement of the hotel there will be a large grill room, dining room, smoking, lounge, and billiard rooms, below which will be a Turkish bath and the engineers' department. A restaurant measuring about 80ft. by 50ft. will occupy the ground floor, over which will be three dining-rooms, drawing-room, and thirteen other rooms, some of which will be arranged *en suite*: the same system will be carried out on the upper floors, the total number of rooms being altogether between 250 and 300. Separate kitchens will be provided for each floor, with communication by lifts.

The total height of the building, from the street level in Piccadilly to the ridge of the roof, will be about 120ft., and the premises will cover a superficial area of 45,000ft. The work was begun in the summer of 1905. Mr. William Woodward and Mr. Walter Emden were originally the joint architects for the building, but when Mr. Emden retired from practice some little time ago, his place was taken by Mr. E. A. Grunning. The contractors are Messrs. Perry & Co.

A new Mixed and Infants' School is to be erected at Christchurch, near Newport, Mon., from designs by Mr. Alfred Swash, F.R.I.B.A., of Newport.

BUILDING PROSPECTS AT SAN FRANCISCO.

Although nearly a year has elapsed since San Francisco was destroyed by earthquake and fire, very little progress has as yet beeen made in rebuilding the city, though it is true that some large new buildings are being erected and some which withstood the catastrophe are being built up again and completed. The main reason for the slow recovery of San Francisco seems to be that outside capital is being kept from investment in the city on account of the labour unions. These bodies have the city practically in their control and have raised wages to such an extent that the cost of building is now far greater than in the States, so that, in some instances, large owners of property have decided not to rebuild until wages drop. Carpenters and other woodworkers have been receiving as much as 30s. a day, and bricklayers as much, while plasterers actually obtain from 11 to 12 guineas a week because of the shortage of this class of labour. Even unskilled labourers for trench digging and



PICCADILLY HOTEL: FRONT TO REGENT STREET QUADRANT. R. NORMAN SHAW, R.A., ARCHITECT.

similar work have demanded £4 a week. An instance of how this affects the total cost of building is given in connection with one of the smaller hotels. This cost originally £3,000 to build; to rebuild it now in exactly the same way would cost £8,000. Practically all men employed in the city are members of some labour union, and the control of these, through what is known as the Building Trades' Council, is so strong that no outside workman can get any employment in the city. An an illustration of the way in which labour is restricted in order to keep up prices, it may be stated that the total number of carpenters engaged is about 3,000, but there is enough work for 20,000; and the same thing applies to the masons and bricklayers. In fact, there is not enough skilled labour in any branch to finish the work required within the next two years.

REINFORCED CONCRETE PILES.

An Appeal Case.

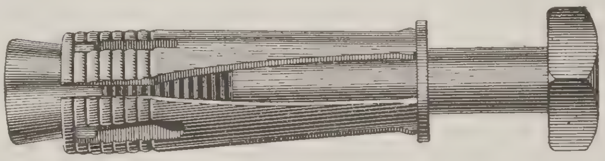
The case of *Mouchel v. Coignet* came before the Court of Appeal on Friday last. It had reference to reinforced concrete piles, and is therefore of much interest to contractors, architects and engineers. The action was brought against Edmond Coignet, Cowlin and Sons, and G. C. Workman for infringing the patent (No. 10,203 of 1897) granted to François Hennebique relating to piles. The defendants denied infringement and raised the objections of want of sufficient invention and want of novelty. It was not disputed that piles of strengthened concrete were unknown in England before the plaintiffs' patent, but strengthened concrete was known and used for many building purposes, and the defendants contended that the alleged invention was merely the application of the material to another purpose, constituting no new invention. They further alleged that such application had been anticipated. Mr. Justice Warrington, in the lower court, decided that the patent was for a new manufacture—namely, a pile capable of being driven and of a particular construction and of a particular material. He considered the patent was for the pile, and there was sufficient invention in the production of it. He also found there had been no anticipation. The patent then being valid, he proceeded to consider the question of infringement, and held that there had been an infringement by Messrs. Cowlin & Sons in works they were carrying out at Bristol. He accordingly granted an injunction against Messrs. Cowlin & Sons with costs. He held that the plaintiffs had failed to prove any infringement by the defendants Coignet & Workman, and as against them the action was dismissed with costs. Messrs. Cowlin & Sons appealed.

The Court allowed the appeal. The Lord Chief Justice, as reported in the "Times," said that counsel for the plaintiffs put a very narrow construction on the patent—namely, that it was simply a patent for a pile constructed in the particular way shown in the specification and drawings. His Lordship, however, said he had come to the conclusion that it was impossible to put on it this narrow construction. The greater part of the argument, however, had gone on the ground that the merit of this invention was the bringing to the notice of the public that a vertical pile could be used for the purpose of a pile mentioned in the specification—that was a pile which was capable of being driven into the ground. He thought that it was impossible to treat that as being an invention which could be made the subject of valid letters patent if all that the plaintiff had done had been to point out that a particular construction could be used in a particular way. If they were to adopt this argument, it would be open to attack on the ground that this was really discovery, not invention; but the great difficulty that he felt in adopting this wide view was that in that case it seemed to him impossible to distinguish between this construction of this specification and the construction of earlier specifications. In his opinion the earlier specifications had brought additions to the stock of common knowledge, such as made it impossible for the plaintiff to put this wide construction on his patent. On these grounds, therefore, his Lordship thought that the appeal ought to be allowed. The Lords Justices also delivered judgments allowing the appeal.

Trade and Craft.

An Expansion Bolt.

The accompanying illustration shows the "Brohard" expansion bolt sold by the Fairbanks Co., of 78-80, City Road, London, E.C. This bolt offers a means of fastening to stonework, &c., which is both handy and economical. It is of greatest service in places where boring through the material in order to secure a fastening is either not practicable or not desirable. The bolt consists of an expanding case, a cone-shaped nut working in the case and serving to expand it, a shank screwing into the cone-shaped nut, with a head or nut at the outer end of the shank by which the bolt is operated. To fix the bolt, all that is required is a hole large enough to take the bolt with its expanding case. Then, by turning the head (which may consist of a screw, bolt, nut, hook or eye), the cone-shaped nut is drawn forward between the expanding jaws of the case, opening them until they bind against the sides of the hole. Any strain on the bolt only tends to expand the jaws still more, and the greater the tension the firmer the hold. The cone-shaped nut is not always regular in shape, sometimes being made to fit the lines of the inside of the case, and so giving a solid bearing at all points of contact. The case is not independent of the shank, as ribs are provided which fit into slotted holes in the case, thus preventing the parts becoming detached from one another and lost. The "Brohard" expansion bolt is made in many sizes and forms, and is useful for many purposes. It deserves to be widely known as a very useful device.



"BROHARD" EXPANSION BOLT

An Invisible Hinge.

Our attention has been called to a new hinge called the "Soss," which is intended to supersede the ordinary pin hinge. Everyone knows that the ordinary hinge must be fixed with its back exposed, otherwise the door would not open. This necessity arises out of the principle of construction—namely, the use of the pin upon which the hinge pivots. The "Soss" hinge is pinless, consisting of three parts which slide one upon another. The slipping or sliding of the middle portion, which takes the place of the ordinary pin gives sufficient play to allow the door to open to its full extent without binding. Nothing protrudes from the door, and if the wood is carefully chosen the joint is hardly distinguishable. For cabinet-makers and show-case makers the "Soss" hinge certainly offers a much better appearance, and should find favour. But its use is not confined to doors, gates, &c., as it is particularly suitable for screens, stands, cases, silver-ware, etc. The manufacturers are Messrs. Hinges, Ltd., 59 and 60, Broad Street Avenue, E.C.

"Minerva" Paint.

Messrs. Pinchin, Johnson & Co., Ltd., of 23-25, Billiter Street, London, E.C., have issued an interesting little booklet (printed in several colours) giving particulars of the manufacture of their new "Minerva" paint. It will be recollected that some time ago Messrs. Pinchin, Johnson & Co. promoted a standard colour-card competition, requiring competitors to select from four differing shades of 60 separate colours the varieties which they considered most correctly corresponded to the names by which the colours were generally known. As a result of the voting, the standard colour card, consisting of 60 standard varieties, was compiled. Of course it would be too much to ask the ordinary decorator to stock 60 different colours, and the "Minerva" paint meets the difficulty by providing 20 deep tints which have been selected as staining colours, from which 80 variations can be produced by the simple addition of a special gloss white. The manufacture is standardised in every detail, and by carefully attending to directions the same tint can be continually reproduced by the decorator without any necessity for the trial and waste which is customary in mixing ordinary paints. With their 75 years' reputation, the manufacturers guarantee the purity of the materials and manufacture with each tint. The "Minerva" paint is made from a mixture of genuine white lead and zinc white, and is claimed to possess the advantage of white lead as regards opacity or covering body and the advantage of zinc white as regards whiteness and spreading capacity. There is no doubt that the ordinary method of allowing the journeyman painter to mix paint for a job is far too elementary, haphazard, wasteful and unsatisfactory. The manufacture and mixing of paints requires chemical knowledge and machinery, and it is becoming more general to buy ready-mixed paint. The booklet under review provides useful information regarding the way in which to use "Minerva" paint so as to secure the best results. It may be mentioned that the paint has considerable spreading power, which renders it particularly economical: 1 gallon will cover 720 ft. super. on a normal surface. The paint is packed in 1 pint, 1 quart, ½ gallon and 1 gallon pails (which can be used as paint kettles), and also in 5 gallon cans or 40 gallon barrels.

Wall-Ties.

Hollow walls require some form of tie to prevent the one pulling or falling away from the other, but ties also have another use—namely, for faced walling, as by their adoption there is no need to use through-headers to tie the face to the backing: ties are also occasionally used for stonework. It has become customary to use a metal wall-tie, and there are several varieties on the market. Some of these, however, do not very well fulfil the necessity of securely locking into the joints; some, too, are expensive. The "Anchor" wall-tie, which is manufactured by the "Clipper" Belt Hook Co., of 251, Deansgate, Manchester, is a very good form, cheap, and admirably interlocking into the brickwork. The tie is made out of flat steel, and its ends can be turned up and down to lock into the frogs of the brickwork. For use in solid work the tie is made entirely flat, but when required for cavity walls the flat metal is twisted up vertically in the middle, where it would occupy the cavity between the walls, and so prevents mortar or moisture lying upon it. It is interesting to note that the manufacturers confirm the general doubt which exists as to the efficiency of galvanized iron. They state that they do not recommend galvanized ties, as a long experience proves that galvanizing destroys the metal. Their ties are specially painted with two coats of anti-corrosive paint. They will supply a galvanized tie, however, if desired.

A Japan Paint.

We have received from Messrs. C. Chancellor & Co., of 13, Clerkenwell Road, London, a pamphlet dealing with their well-known Japan paint named "Velure." This paint needs no varnish, and has noteworthy spreading, elastic and weather-resisting properties. On former occasions we have called attention to the inefficiency of ordinary paint as mixed by the journeyman painter. The materials may be of the very best, but the manufacture of paint requires considerable knowledge and the use of proper machinery for its manufacture, which the ordinary craftsman does not possess. The tendency in modern paintwork is all in the direction of obtaining paints from reliable manufacturers ready-made and mixed. "Velure" is a case in point. The use of this paint undoubtedly saves time, labour, varnish, and money. One coat is considered to be equal to two of ordinary paint and one of varnish. We need hardly mention that "Velure" is sanitary and washable. It is free from liability to crack, chip, peel, blister, or fade, and is remarkably lasting; 120 colours are kept in stock, and any shade can be matched. It is estimated that one gallon will cover about 90 sq. yds. if applied on a flat, non-absorbent surface. The booklet gives directions as regards its use. We learn that when the paint gets too thick for use, which it occasionally does, either on account of cold or of its having been kept a long time, the addition of a thinner is not advocated. In most cases, it is stated, if the paint is gently warmed through it will reach its proper constituency—*i.e.*, rather thicker than good varnish, but will work as easily as varnish. If a thinner is found to be really necessary it is used sparingly, and the ordinary thinner such as turps or oils should not be used, but only the special "Velure" thinner, supplied by the same manufacturers. The pamphlet contains suggested specification clauses for various purposes, and these will no doubt be found of service. Finally, other special manufactures by Messrs. Chancellor, such as varnishes, a floor paint, a cycle enamel, a damp preventive, a stone preservative, and "Fumood" (a special preparation for darkening wood as a substitute for fuming), are dealt with.

Glass Tiling.

Messrs. Chance Brothers & Co., Ltd., of smethwick, near Birmingham, have just issued a new catalogue of their "Venturene" wall tiles. These are a variety of glass tiles, made by a patented process, which ensures uniform size and clean-cut edges, enabling joints in finished work to be made very narrow. As rounded external and internal angles can be produced, the necessity for corners is obviated, and this, combined with the fact that the joints are so fine, makes the "Venturene" wall tiles particularly serviceable for hospitals and similar buildings. The tiles have a raised pattern surface. The catalogue contains some useful directions as regards fixing the tiles to walls. In ordinary work, walls are rendered in Portland cement, on which the tiles are set in Messrs. Chance Brothers' special cement, or Keene's or Parian cement may be employed. For outdoor work a mastic cement should be used for setting.

Builders' Notes.

Cornish Granite Trade.—The granite trade in the country districts around Penryn is depressed. The men of the stonemasons' societies have asked for an advance in the rate for cutting, but Messrs. Freeman, Son & Co., Ltd., have stated that they cannot grant an increase. Business seems to come to somewhat of a standstill, and it is expected that the large granite quarry at Rosemontroweth, Stithians, will be closed down.

L.C.C. School of Building.—The following have been appointed as an advisory sub-committee for this school:—Messrs. W. H. Atkin Berry, F.R.I.B.A., W. J. Carpenter, J. S. Holliday (of Messrs. Holliday & Greenwood), F. Higgs (of Messrs. F. & F. H. Higgs), H. R. Taylor, G. Dew, Lewen Sharp, F.R.I.B.A., F. Barter (United Operative Plumbers' Association), and R. F. Gilling (National Association of Operative Plasterers).

An Excellent Scale.—A short time ago, when noticing some New Year souvenirs sent out by certain firms, we took occasion to observe that, instead of the familiar calendar, it might perhaps be found better to give some useful thing used by architects and builders every day. We have now received from Messrs. Mark Fawcett & Co., the well-known firm of 50, Queen Anne's Gate, Westminster, an excellent scale marked off in eighths on both edges. It runs out to 100ft., and has a space at either end which allows a quantity surveyor to hold the scale with both hands when taking off, while at the same time leaving all figures in full view. The scale is one of the best we have come across.

A new Cement Works has been established at Micheldean, in the Forest of Dean. It gives employment to 80 men. Many years ago a small works was started and worked with coke, but eventually closed. Mr. W. Fennell, the present manager, knowing the nature of the cement to be obtained, worked hard to induce a company to take it up, and this was recently done by Messrs. A. O. Brown, Ltd., who have put down plant. The preliminary tests have been successful. Forest of Dean coal is used, and about 6,000 tons will be required annually. So many orders have come in that the first year will see an output of 25,000 tons of cement. The manager states that it will be necessary to double the plant and staff during the next twelve months.

The Builders' Exchange Club, Birmingham was inaugurated on Thursday last. The president for the year is Mr. Ebenezer Parkes, M.P. for the Central Division of Birmingham, and the vice-presidents are Major J. Howard Cartland, J.P., Alderman J. J. Gillings, J.P., Councillor H. M. Grant, Mr. A. Hanaley, Mr. W. Sapcote, Mr. Ralph Webb, Mr. J. B. Whitehouse and Mr. F. J. Whittall, with a general committee, upon which are other builders, and many of the principal firms are represented. Vice-president Mr. Sapcote officiated at the opening ceremony and described the utility of the institution for architects, builders and others, and referred to the progress made under the able management of Mr. W. J. Spurrier, the founder and secretary. The next item on the programme was a demonstration of concrete-block-making by Messrs. Dunmore & Co., of Irthlingborough, Northants. Mr. Spurrier then explained and demonstrated the merits of the Chappuis Daylight Reflectors, brought into position by pulley and cord and then raised to reflect the light. Next he illustrated the action of the Van Kannel panic revolving door, which opens when a crowd collects and presses against the closed door. A very interesting demonstration was given in connection with the new "Metal Ladder Tape." This is a Birmingham invention and production, and was used in the building of the new telephone boxes at the Builders' Exchange. 10,000 feet of it occupy only a cubic foot, which is opened out into the "ladder" by being pulled through a simple tool. The ladder tape is then stretched and laced on to a framing, or uprights, and plastered. In the evening Mr. L. P. Ford delivered a lecture on Ford stone.

New Companies.

Ridge Hill Brick and Tile Co., to acquire the business carried on by J. C. Cadman and T. Johnson, Ridge Hill, Madeley, near Newcastle, Staffs. Capital: £5,000.

Hubbard's, to acquire the business of builders and ironmongers, &c., formerly carried on by the late E. Hubbard at Eastbourne. Capital: £10,000.

Woolmer Estate Brickworks, to adopt an agreement with Sir Archibald J. Macdonald, Bart., for the acquisition of the business of a brick manufacturer carried on by him at Griggs Green, Liphook, Sussex. Capital: £12,000.

Bagasse Co., to adopt an agreement with N. C. Corney and to carry on the business of merchants, plasterers, dealers in bagasse and building materials, &c. 90, High Holborn, W.C. Capital: £2,000.

Industrial Building and Commercial Co. of Egypt, to acquire land at Mariout and Ramleh; to take over the business of an architect and engineer carried on by Cav. G. G. Mattioli; to acquire sawworks and to carry on the business of builders, contractors, &c. Capital: £500,000.

Peerless Dennis & Co., builders and contractors, 4, Langney Road, Eastbourne. Capital: £10,300.

Humphrey Williams (The Penlon and Hirael Slate Works), Bangor. Capital, £5,000.

Bushey-Heath Brick and Tile Co., 138, High Holborn, W.C. Capital: £2,000.

Midland Plumbing, Warming and Ventilating Co., Ltd., Nottingham. Capital: £2,500.

Alfred Carter & Co., timber merchants, 260, Cambridge Road, E. Capital: £15,000.

Thomas Bendon, builders, contractors, &c., 48, Chancellor's Road, Hammersmith, W. Capital: £4,000.

The Month's Trade

Reports by our Special Correspondents.

THE CLAYWORKING INDUSTRY.

The season of the year naturally causes employment with the clay-working trades to be somewhat dull. In the brickfields, of course, employment is slack. Trade must, however, improve in a few weeks' time, and it is hoped on all hands that the bad times for the brick trades will have passed, as a good many large buildings proposed will call for large numbers of clay goods as well as for other building materials. Employment has continued slack of late at Peterborough, Ruabon, Wrexham, and Nottingham, while it has also been quiet at Ipswich, Sudbury, and Chelmsford. In Shropshire three-quarter time has been worked. In Devonshire, on the other hand, the weather has allowed work to be carried on with very little interruption, and employment has been fairly good. It has also been good in South Wales and Monmouthshire, and, furthermore, some improvement has been shown on previous months. Employment has been fair in South Staffordshire and in the Tees and Hartlepool district.

THE STONE, GRANITE, MARBLE, AND SLATE TRADES.

During the past month the weather has been comparatively mild, but nevertheless it has been sufficiently severe to interrupt work in the quarries, although these have continued to be exceptionally well employed for the time of year, in all probability due to better trade. In fact, so far as we can hear, the demand for the various materials dealt with under this heading is much brisker than last year. This, too, is shown by the fact that the masons and slaters have been a little better employed than twelve months ago. It is evident that trade will now begin to pick up with the better weather, and we shall probably see a considerable revival this spring.

Employment in the limestone quarries has continued good in Cumberland and South Durham. At the quarries in Weardale it has been fairly good. In the Buxton district it has been fair, though affected by the weather. Employment has been somewhat irregular in North Wales owing to the weather. In the Plymouth district it has been moderate. In the Somerset blue lias quarries employment has been bad. In the Bath stone quarries it has been slack.

In the sandstone quarries in North Wales and the Sheffield district employment has been quiet, bad weather causing interruption. In the grindstone and building stone quarries in the Rowsley district employment has been irregular owing to the weather. In the Gateshead district it has been moderate, with short time. In the Gloucestershire pennant stone quarries employment has been bad, and it continues bad in Forfarshire.

Employment has been good and better than a month ago in the Clee Hill road-material quarries.

In North Wales employment has continued good with settmakers, and fair in Aberdeenshire and at Edinburgh. It is reported as fair at Airdrie and Glasgow. At Rowley Regis it is fair, and better than a month ago. Employment is dull, with short time, at Stoney Stanton, and quiet in the Clee Hill district.

The granite trade has continued good in North Wales and fair in Leicestershire. On Dartmoor and in the Penryn district employment has been dull. In Aberdeenshire it has been fair, on the whole, though interrupted by severe weather.

The slate trade in North Wales shows an improvement in the Festiniog district, while it continues fair in Carnarvonshire. The bad weather, however, still somewhat hinders work. There is a slight improvement in Ballachulish, Argyllshire, but employment is still somewhat dull.

Last year we referred in these columns to the "Norman Old" roofing tiles and ridges that Messrs. Roberts, Adlard and Co., were offering, and we hear now from this firm that our anticipations that the pleasing effect of these on several styles of building would cause them to be rapidly taken up by architects have been entirely fulfilled. We understand that anticipations in this direction have been much exceeded, and that, though of course in smaller quantities, there has been especially an appreciable demand for the "Old" ridge tiles for use on roofs covered with Westmoreland or "Eureka Unfading Green" slating, where the effect is stated to be much appreciated.

The returns for imports of stones, slabs and marble, rough, hewn and manufactured, for the month of January, 1907, as compared with the same month in 1905 and 1906, are as follows:—

Tons.			Value.		
1905.	1906.	1907.	1905.	1906.	1907
88;585	109,803	87,376.	99,324	122,174	95,179

THE PORTLAND CEMENT TRADE.

During the past few days prices for Portland Cement in the London and several other districts have been advanced in response to the higher prices now being demanded by manufacturers. It is being freely stated that, notwithstanding this recent advance, manufacturers are barely recompensed for the additional cost of production, and that home prices are still considerably less than the figures which are readily obtained for all other markets. There is no abatement whatever in the export demand, and when the normal spring demand for Portland Cement asserts itself in this country there is no doubt that this anomaly will disappear, and that prices will advance to the level which is obtainable in other markets. Stocks of cement at works in the aggregate, if anything, are less than they were a year ago, and it is no secret that manufacturers generally are anticipating a full demand for all their output during the spring and summer months. Imports of foreign cement into this country have dwindled to a low point, and the total quantities imported for the month of January last amounted only to 7,725 tons, which is indicative of two things, namely—that consumers here have at last realised the inferior quality of these imports; and that the foreign manufacturer in face of his difficulties is less keen than he was on pushing his wares in this country.

The returns of imports and exports of cement for building and engineering purposes for January, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.

	1905.	1906.	1907.
Tons -	- 14,523	12,827	7,725
Value -	- £20,529	16,599	10,201

EXPORTS.

	1905.	1906.	1907.
Tons -	- 28,185	46,909	60,633
Value -	- £45,718	73,087	96,685

THE IRON AND STEEL TRADES.

Throughout last month the speculation in pig-iron warrants continued, and prices slowly fell. It is remarkable that this should have been possible, for the stocks of pig iron at the public stores are very much less than they were last year at the same time, while the makers have plenty of orders in hand to last them for a long time. Of course this season of the year is always the slackest, and trade is not expected to advance until the spring. This speculation, however, in pig-iron warrants depresses the trade, be the prospects never so favourable, and buyers are holding back orders. The makers can, however, afford to hold aloof for a considerable time longer, and wait for the rise which must come in a few weeks' time. The stock of half-a-million tons at Middlesbrough is too large to be without influence on the market, notwithstanding the fact that it is a quarter-of-a-million less than last year, owing to heavy shipments abroad, to the United States, Germany, France, Italy and Belgium. The foreign market does not warrant any pessimistic views, and the users of pig iron are well employed, so that it seems impossible to doubt that the market will shortly recover with a bound.

As regards manufactured iron and steel the demand continues excellent. In one or two departments fresh business is, perhaps, somewhat restricted, but it is hoped that the spring demand will amend matters. The majority of works are well off for orders. Prices are well sustained. Of course the increased cost of raw material would prevent any fall in this direction; prices ought, however, to rise, and the delay probably results from the slight depression in the pig-iron market.

In South Staffordshire the makers of pig iron are trying their best to keep prices up, but it looks as if they will be compelled to give in, unless the market rapidly pulls up. Structural steel is finding a good market, and other manufactured iron seems to be well situated.

The north-west of England feels the prevailing depression in the pig-iron market. Manufactured iron and steel seems to be in good demand with a fair number of orders going.

The return for imports and exports in certain branches of manufactured iron and steel for the month of January, 1907, as compared with the same month in 1905 and 1906, are as follows:—

	Imports.			Exports.		
	1905.	1906.	1907.	1905.	1906.	1907.
Puddled Iron - - - - - - - - - tons	10,807	9,899	14,127	43,844	90,700	175,915
Wrought iron, in bars, angles, rods and sections - - - -	6,171	13,637	7,965	10,018	10,301	13,318
Rails - - - - - - - - - - - - - -	986	2,366	3,777	42,261	35,346	30,225
STEEL:—Girders, beams, joists and pillars from Belgium - -	6,628	12,820	4,324	5,173	8,834	9,028
,, ,, ,, ,, other countries-	2,806	3,816	3,212			
Ingots, blooms, billets, slabs, sheet bars, tin plate bars, or similar partly manufactured - - - - - - - - -	46,851	66,328	21,492	646	219	2,242
Bars, angles, rods and shapes or sections - - - - - -	4,016	6,822	1,160	9,622	13,922	21,317
Galvanized sheets (flat or corrugated) - - - - - - -	—	—	—	35,076	46,261	41,761

The full force of the speculative movement in pig iron is felt in the North of England market. The makers are, however, holding on. The American demand for pig iron continues, and during this month shipments will begin to Germany, when canals and rivers open for traffic. Stocks are still decreasing, but at a somewhat slower rate. The demand for manufactured iron and steel continues good, and there are no indications of any falling off. There are plenty of contracts in hand.

As regards the foreign market, the prices of iron and steel in Germany and Belgium have declined somewhat. America continues to make demands on our pig iron, but prices are declining there also.

OTHER METALS.

The supply of copper continues short and prices are high. The market is in a very strong position, and will be for a long time to come.

Tin continues in great demand, and the production is insufficient. Prices continue firm.

Lead continues at a high figure. Last year consumed practically all the lead in the market, and this year has started without any stock to fall back on. Yet despite the increased use, the consumption of lead in England fell off last year. It is to be hoped that our industries using lead will this year show that they are not behind those of other countries.

THE IRONMONGERY TRADES.

At Wolverhampton and Willenhall employment in the lock and latch trades continues bad. It has been good with all branches of the hollow-ware trade in Wolverhampton; fair with the hollow-ware makers at West Bromwich; slack with the hollow-ware stampers and buffers at Sheffield.

In the stoves, grates, &c., employment continues moderate at Rotherham, but bad at Falkirk, Glasgow, and Leeds.

Employment with nut and bolt makers has been good at Winlaton and Darlaston, and fairly good at Birmingham. At Birmingham it has been good with nail and shoe rivet makers. At Blackheath it continues good with rivet, wrought nail, nut and bolt makers.

Employment with wire makers has continued good generally.

Following the preliminary meeting of builders' merchants in London, held at the end of January, another meeting was held on February 12th, when it was definitely decided to form "The Builders' Merchants and Wholesale Ironmongers' Association," Mr. Charles Gray (of Messrs. Winstone & Co.) being elected president, and Mr. Henry O'Brien (of Messrs. O'Brien, Thomas & Co.) and Mr. Pryke vice-presidents. The object of the Association is to look after the interests of the builders' merchants and wholesale ironmongers. It was pointed out at the meeting that there were many matters for which no redress could be found by individual protest, but which might be remedied by the influence of the Association—such as the breakage of goods in transit by railway companies, the establishment of showrooms in London by manufacturers so as to sell direct to the consumer instead of through the legitimate channel of the merchant. The chairman (Mr. Charles Gray) said that a subject to which the committee had given much consideration was the drawing up of a uniform list of selling-prices. The committee, however, had come to the conclusion that at the present moment it would not be wise to make any definite pronouncement on the matter: it was a very delicate question to go into at the present time. Mr. Williams (of Messrs. E. & C. Braby) alluded to the unsatisfactory practice of many manufacturers running about on builders' jobs endeavouring to secure the whole of the work through the intermediary of an agent, who very frequently was content with a mere profit of from 5 per cent. to 7½ per cent. Manufacturers should give their preference to the well-known firms who kept large stocks, as against the notebook agent who merely occupied an office and had no expenses beyond that.

Door and Window Fittings.—It may not be generally known that, in addition to his well-known patent specialities in door springs and window fittings of all kinds, Mr. Robert Adams manufactures and supplies practically all other kinds of fittings, and undertakes, in fact, the entire equipment of doors and windows.

The returns for imports and exports for January, 1907, as compared with the same month in 1905 and 1906 are as follows:—

	Tons.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907.
IMPORTS.						
Wire nails	3,165	3,704	3,568	£32,426	39,545	35,139
Nails (other than wire nails), screws and rivets	956	1,093	771	17,133	18,416	15,017
Bolts and nuts	380	502	507	6,464	8,667	9,140
EXPORTS.						
Nails, screws and rivets	2,028	2,653	2,394	38,794	44,440	44,172
Bolts and nuts	1,762	1,847	2,234	29,724	33,408	42,504

THE WALLPAPER TRADE.

With reference to Wallpaper Manufacturers, Ltd., and non-trust manufacturers, a correspondent writes: "There are in England eight mills not connected with the trust, from which supplies can be had, and these mills are prepared to lay down new machines as trade requires. What a difference from eight years ago! Then one could not buy a piece of machine-printed paper other than that printed by the combine; whereas, now, between the German goods and those of non-trust manufacture, not a penny short of half-a-million pounds' worth of wallpaper is sold in this country annually with the printing of which the combine have nothing to do." Another correspondent writes: "In 1899 Wallpaper Manufacturers, Ltd., was registered with a capital of four millions, and secured an absolute monopoly of the market. The natural result of this was that prices were advanced and merchants and manufacturers reaped a rich harvest at the expense of—the public. Foreign competition, which hitherto had little chance, was immediately fostered. The Board of Trade returns amply prove this statement; the year 1906 records £130,000 as against £34,000 for the year 1899. Free houses have also been established, and all are doing a thriving business, there now being eight mills in full working order and employed night and day. One of these has an average output of 250,000 rolls weekly, this number being only exceeded by one of the trust branches. The success of the free house is the more remarkable when one considers the great disadvantage under which these smaller mills work. Their patterns when issued are immediately copied and produced at a cheaper rate by the 'combine,' the result being the 'free' goods are considerably reduced in value."

It will be a convenience to many to know that a large and highly artistic selection of wallpapers and similar decorations to choose from can be found in the City at the old-established showrooms of Messrs. Chappell & Payne, in Queen Street, London, E.C. We are informed that consequent upon the introduction of new interests their showrooms have been enlarged, redecorated throughout, and in addition are now brilliantly lighted by electricity. Mr. Chappell, whose advice has been much appreciated by many in the past, continues to place his services at the disposal of customers,

THE GLASS TRADE.

Employment with glass bevellers has been quiet of late in Birmingham. With sheet glass flatteners at St. Helens employment has continued good, however, and with London glass blowers it has been fairly good.

The returns for imports and exports of glass for the month of January, 1907, as compared with the same month in 1905 and 1906, are as follows:—

	Cwts.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907
IMPORTS.						
Window and German Sheet, including shades and cylinders	75,104	127,974	129,916	£41,912	73,696	73,596
Plate	43,969	38,236	40,391	52,892	50,027	49,013
EXPORTS.						
Plate	9,452	12,866	15,046	13,870	18,805	22,470

THE PAINT TRADES.

The paint trades continue fair. As regards materials, the returns for imports and exports for January, 1907, as compared with the same month in 1905 and 1906, are as follows:—

		Quantity.			Value.		
		1905.	1906.	1907.	1905.	1906.	1907.
IMPORTS.							
White lead	Cwts.	27,705	29,173	21,590	£22,404	25,268	21,093
Zinc oxide		18,527	27,468	21,928	18,600	26,855	24,791
Other colours and pigments		116,939	142,719	144,945	69,138	72,170	85,902
Turpentine		31,290	36,602	44,511	54,976	76,781	89,639
Lac-dye, seedlac, shellac and sticklac		9,568	7,821	10,039	83,836	66,911	95,739
Linseed oil	Tons	98	2,401	2,537	1,842	49,600	51,386
EXPORTS.							
White lead	Cwts.	24,538	39,313	34,483	23,696	40,961	39,651
Zinc oxide		1,314	7,144	10,349	1,579	9,219	12,205
Other colours and pigments		97,328	117,667	123,706	130,726	161,483	161,185
Linseed oil	Tons	2,323	1,965	2,019	42,170	42,692	49,468

and it appears that in addition to the firm's own selected designs, as shown in their various pattern books, a large selection of patterns from various West-End houses can, if desired, also be seen. We believe an opinion exists in some quarters, consequent on the high artistic reputation Messrs. Chappell & Payne have obtained, that only the more expensive paper hangings are obtainable, but this, we are assured, is a wrong impression, as the firm especially issue a pattern book showing the lower-priced designs. As they also stock some few of the more particularly select French patterns, it will be obvious that for those to whom City stations are more available there is no necessity to travel further than Cheapside.

The following is the return of paper-hangings issued by the Board of Trade for January, 1907, as compared with the same month in 1905 and 1906:—

	1905.	1906.	1907.
IMPORTS.			
Cwts. - -	4,557	6,329	6,515
Value - -	£13,845	£18,334	17,463
EXPORTS.			
Cwts. - -	7,576	8,944	8,461
Value - -	£21,194	25,084	23,362

THE TIMBER TRADE.

London Market in January.

There was no great change in the position of the London wood market during January. Messrs. Churchill & Sim report that the dock deliveries were smaller by about 800 standards than were even the small ones of January, 1906, and although this has partly been made up by a slight increase in the overside business it points to the continuance of a poor demand, which, in face of the very heavy accumulation of stock, is not an item which can be in any way ignored. Prices went up quietly throughout the month entirely on account of the position of the free-on-board markets in the shipping countries. The business effected for further supplies in the coming season has been very large and very satisfactory from the shipper's point of view. Continental buyers having secured the greater part of their more immediate requirements before Christmas, the bulk of the January business was arranged with the English importers, who have agreed to the higher level of prices sooner and more readily than was expected. Large importing centres, such as London, Hull, Grimsby, &c., are still holding back, and in spite of the large quantities cleared and the strong evidence which exists of prospective short supplies from Sweden there seems little doubt that they will find a sufficiency of stock still available when they are ready, but at the same time it is becoming daily less likely that there can be any change of prices in their favour when that time comes.

Messrs. Denny, Mott & Dickson's report for January is as follows:—"Business during January has been of a quiet, but not unsatisfactory character. A satisfactory increase in the demand for soft woods has still not been realised, but this should come as the winter passes. In hardwoods the difficulties in supply have narrowed business, but fair profits continue to be realised on the diminishing turnover."

The abstract of dock stock, consumption, &c., for January, published by Messrs. Foy, Morgan & Co., is given in the table at the foot of this page.

Dock Stock.

The stock of wood in the public docks on January 31st was:—

	Pieces.
Foreign deals and ends - - -	2,151,000
Do. battens - - - -	3,503,000
Pine deals and battens - - -	740,000
Spruce do. do. - - -	1,041,000
Boards, rough - - - -	4,420,000
Do. prepared - - -	7,441,000

totalling 19,296,000 pieces, as against 16,286,000 in 1906, 19,666,000 in 1905, and 23,125,000 in 1904.

In other kinds the stock was as follows:—

Foreign wainscot logs - -	284	pieces.
Do. oak timber - -	912	loads.
Do. fir timber - -	3,303	do.
Do. Oregon pine, &c., spars and masts - -	3,110	do.
Colonial oak timber - -	398	do.
Do. birch timber and planks -	6,068	do.
Do. elm and ash timber -	856	do.
Do. yellow pine - -	913	do.
United States pitch-pine timber	16,593	do.
Do. do. deals -	49,000	pieces.
East India teak - - -	6,721	loads.

Deliveries.

The deliveries for January were:—

	Pieces.
Foreign deals and ends - - -	262,000
Do. battens - - - -	406,000
Pine deals and battens - - -	67,000
Spruce do. do. - - -	105,000
Boards, rough - - - -	511,000
Do. prepared - - - -	1,047,000
Total - - - -	2,398,000

The deliveries direct from ship to craft were:—

	P.s.h.
Deals and battens - - - -	3,722
Boards - - - - -	813
Total - - - -	4,535

Soft Woods.

Swedish Deals, Battens and Boards.—Business during January was small, but prices have been very firm. Deals especially have come more into favour at improving rates, but it has to be borne in mind that the demand is really so far very limited, and that the stocks now in London are largely in excess of what is wanted for the present rate of consumption between this and the re-opening of the navigation.

Norwegian Boards. — There is no change to report in the London flooring market. The demand has been a quiet one, and there has been very little alteration in prices one way or the other.

Russian Deals, Battens and Boards.—In London the small demand has been easily satisfied at improving prices and deal sizes have been rather more enquired for than they were in the autumn. For future shipment prices have opened more cheaply than was expected, especially for the lower classes of deal sizes, which can be bought at practically the same rates as last season. There is however, this year, a quite unusual difference between the rates for these basis lines and for boards of the same width, which are eagerly sought after at many additional shillings per standard. Prices for the higher qualities and for the increasing proportion of smaller sizes also are relatively on a much better level. A large business was effected during the month.

Finnish Battens.—There was a small steady demand during January at prices which compare favourably with those current here before the turn of the year, but which are still far from the equivalent of those that are being rather eagerly paid for arrival in the spring. The demand in the latter case is very widespread, and will take a good deal of satisfying.

Prussian Timber.—The London market for fir timber was very stagnant during January, and prices are nominal. For oak the demand has been steadier, with but little alteration of price. The cost of both in Prussia seems to be advancing again, and shippers are hard put to it to get their profits.

Canadian Timber.—The market for pine deals in London has been very quiet, and prices rather stationary. Here again the cost of the new season's supplies is once more on the upward grade and the supplies themselves difficult to come by. For spruce the position is a little different, and although there has been so far no improvement in London prices the rates for arrival during the season stiffened during the month and a considerable business has been done in spite of an apparently ample volume of supply. For sawn pitch-pine timber there was some heavy selling in London during January, and prices have stood up well during the process on the whole. Rates have fallen from what they were nominally before Christmas, but a good deal of inferior wood has been cleared off, and except for small timber the reduction is not material. For cargoes for shipment something under the higher rates current last year is being asked, and this seems to have frightened buyers and stopped business for the moment. For pitch-pine planks there has been little change in London.

Hard Woods.

Teak.—Messrs. Denny, Mott & Dickson report that the landings in the docks in London during January consisted of 281 loads of logs and 410 loads of planks and scantlings, or a total of 691 loads, as against 1,755 loads for the corresponding month of last year. The deliveries into consumption were 739 loads of logs and 480 loads of planks and scantlings—together 1,219 loads, against 1,769 loads for January, 1906. The small import of 691 loads for both logs and planks contains fully 46 per cent. of Java wood, reducing the import of Burma and Siam wood to the insignificant quantity of 372 loads. The consumption of 1,219 loads

Abstract of Stock, Consumption, etc., for JANUARY.

ALL DOCKS.	DEALS (FIR).	BATTENS (FIR).	PINE.	SPRUCE.	PITCH PINE DEALS.	DEALS & BATTENS. In aggregate.	ROUGH BOARDS. (All Countries).	FLOORING.	FLOATED TIMBER.
1907. Public Dock stock ...	1,829,130 pcs.	3,775,773 pcs.	740,110 pcs.	1,040,585 pcs.	48,454 pcs.	7,434,052 pcs.	4,420,143 pcs.	7,440,437 pcs.	24,500 lds.
Monthly ,, ,, consumption	236,387 ,,	441,306 ,,	67,087 ,,	105,171 ,,	8,155 ,,	858,106 ,,	504,990 ,,	1,003,338 ,,	3,347 ,,
Overside stock	650,064 ,,	1,213,591 ,,	184,489 ,,	289,220 ,,	—	2,337,364 ,,	1,388,722 ,,	963,204 ,,	—
Overside consumption (estimated of dock) 111% Sawn 60 ,, Planed	262,390 ,,	489,850 ,,	74,467 ,,	116,740 ,,	—	943,447 ,,	560,539 ,,	602,003 ,,	—
Duration of supply at same rate of consumption	4'97 months	5'36 months	6'54 months	5'99 months	5'94 months	5'42 months	5'45 months	5'23 months	7.32 months

is almost embarassingly large in face of the small supplies, but it is to be noted that about 30 per cent. of such consumption has been filled in Java wood. It must also be borne in mind that no less than 40 per cent. of the small total dock stock of logs and planks is Java wood, so that the market for Burma and Siam teak promises to dwindle to a vanishing point unless imports come forward more freely as the year progresses.

Mahogany.—This market has been stimulated by better arrivals, Honduras again being the most encouraging contributor in this respect. The demand was fairly satisfactory and prices continue very firm in face of the moderate stocks.

Messrs. C. Leary & Co.'s report as to mahogany is as follows:—"But for a welcome increase in the supplies afforded by a shipment from Belize the arrivals would again have been on a meagre and insufficient scale. The consumption continues satisfactory and the one public sale which was held was attended with excellent results; the prospects continue steadily to improve."

Odessa Oak.—This market has presented little feature as all supplies in sight have been booked forward for consumption, and at present there are none seeking for sale. Although the ready sale of this high-class description of wood is causing every exertion to be made to develop the supplies as the year progresses, the necessity for consumers to buy for forward shipment is still likely to continue, as there is little likelihood of there being any arrivals which can be spared for stock purposes.

Bankruptcies.

[Abbreviations: R.O.—receiving order; P.E.—public examination; C.C.—county court; O.R.—official receiver; Adj.—adjudication.]

DURING THE WEEK ending March 1st, thirty failures in the building and timber trades in England and Wales were gazetted.

N. WAY, builder, Forest Hill. R.O., Feb. 12.

J. CROSBY, builder, Stockport. R.O., Feb. 13.

E. WYATT, builder, Teddington. R.O., Feb. 14.

R. J. Smith, builder, Camberley. R.O., Feb. 15.

A. FILER, builder, Horfield. Gross liabilities, £25,717.

W. WHITEMAN, builder and contractor, Hove. R.O., Feb. 23.

F. FOSTER, builder, Lichfield. Liabilities, £260; deficiency, £45.

W. E. CHAMPION, builder and decorator, Woolwich. R.O., Feb. 22.

REES BROTHERS, builders and timber merchants, Whitland. R.O., Feb. 21.

J. W. COATES, builder, London. Gross liabilities, £77,503; £11,866 unsecured.

G. BULLOCK, builder and contractor, Shrewsbury. Liabilities, £1,570; assets, £740.

E. WYATT, builder, Teddington. P.E., Kingston C.C., March 26, at 2.30. R.O., Feb. 14.

W. H. BLOOMFIELD, builder, Ipswich. P.E., Shire Hall, Ipswich, March 15, at 10.30.

R. JENNINGS (Jennings & Son), contractor, London, E.C. Liabilities, £1,148; assets, *nil*.

W. WINDEBANK, builder, London. P.E., Bankruptcy Court, March 12, at 11. R.O., Feb. 11.

A. BENNETT, builder and plumber, Hull. Gross liabilities, £4,617; expected to rank, £602; assets, *nil*.

T. ELEY, builder, Derby. First meeting, O.R.'s, Derby, Feb. 27, at 11. P.E., Derby C.C., March 12, at 11.

T. ELEY, builder, Derby. Gross liabilities, £1,034; £382 expected to rank; assets, £120; deficiency, £261.

A. FILER, builder, Bristol. First meeting, O.R.'s, Bristol, Feb. 27, at 12. P.E., Guildhall, Bristol, March 1, at 12. R.O., Feb. 14.

J. CROSBY, builder, Stockport. First meeting, O.R.'s, Stockport, March 6, at 12. P.E., Stockport C.C., March 15, at 10.15. R.O., Feb. 13.

F. A. YOUNG & Co., builders, Luton. First meeting, Chamber of Commerce, Luton, Feb. 28, at 12. P.E., Luton C.C., March 21, at 11.30.

S. YOXALL, painter and plumber, Congleton. First meeting, O.R.'s, Macclesfield, March 7, at 11. P.E., Town Hall, Macclesfield, March 21, at 10.30.

N. WAY, builder, Forest Hill. First meeting, 132, York Road, S.E., March 8, at 12.30. P.E., Greenwich C.C., March 19, at 1. R.O., Feb. 12.

F. PECK, builder, Bedingfield. First meeting, O.R.'s, Ipswich, March 15, at 12.30. P.E., Shire Hall, Ipswich, March 15, at 10.30. R.O., Feb. 21.

W. A. STEVENS, builder and ironmonger, Highgate. First meeting, Bankruptcy Court, March 7, at 12. P.E., same, March 26, at 11.30. R.O., Feb. 22.

PETTIFER & Co., builders, Melton Mowbray. First meeting, O.R.'s, Leicester, March 6, at 3. P.E., The Castle, Leicester, March 22, at 10. R.O., Feb. 18.

Partnerships

[*The date when the partnership was dissolve is given in parenthesis where known.*]

C. LEATHER & SONS, builders, Putney (Feb. 20).

DAWKES BROTHERS, builders, Leamington (Jan. 28).

W. H. LEIGH & Co., timber merchants, Salford (Jan. 31).

BAKER & MAY, architects and surveyors, Colchester (Feb. 9).

BENNETT BROTHERS, builders and contractors, Burslem (Feb. 9).

J. SEYMOUR & Co., timber merchants, Strood (Aug. 5, 1906). Debts by G. Sands.

DREYFER & Co., painters and decorators, Hull (Feb. 2). Debts by P. G. F. Looke.

HALSALL, TONGE & CAMPBELL, architects, Southport (Feb. 1). Debts by F. Campbell.

HARRINGTON & LEY, architects and surveyors, Romford and Frinton-on-Sea (Dec. 31).

MULTON & WALLIS, builders and contractors, Gravesend (Dec. 31). Debts by E. Wallis.

BRADBURY & HITCHEN, joiners and builders, Stalybridge (Feb. 19). Debts by J. Bradbury.

PEERLESS-DENNIS & Co., builders and contractors, Eastbourne (Dec. 31). Debts by C. Peerless-Dennis.

G. DOERGE & Co., decorators, painters, &c., Liverpool (Jan. 31). Debts by G. Doerge, who continues.

DONKIN & STEPHENSON, cement agents and builders' merchants, Newcastle-upon-Tyne (Dec. 31).

NAYLOR & MITCHELL, builders, Halton (Feb. 7). Debts by W. Naylor, who continues in his own name.

WILKINSON & WATERMAN, builders and contractors, Birchfield (Jan. 24). Debts by W. Wilkinson, who continues.

T. WORTHINGTON & SON, architects, Manchester (Dec. 31). Debts by P. S. Worthington, who continues.

WATMOUGH & PRESTON, builders & contractors, Bradford (Feb. 6). Debts by J. Watmough, who continues.

WALKER & CARR, builders, Newcastle-on-Tyne (Dec. 1). Debts by W. R. Carr, who continues in his own name.

WATSON & ELLWOOD, builders, house decorators, &c., Dulwich (Sept. 30, 1906). Debts by T. Watson, who continues.

ROBINSON & KIDD, architects and surveyors, Birkenhead (Jan. 21). Debts by C. E. Robinson, who continues.

SPRAKE & WILKINS, builders and contractors, Weston-super Mare (Feb. 14). Debts by G. Sparke, who continues.

BROOKER BROTHERS, builders, contractors, &c., East Grinstead (Dec. 31). Debts by J & T. E. Brooker, who continue.

COTTRELL & BESZANT, painters, plumbers and decorators, Liverpool (April 3, 1905). Debts by E. N. Beszant, who continues.

BURNHAM BROTHERS, plumbers, painters and decorators, &c., Alfreton (Nov. 28). Debts by J. Burnham and J. Kenworthy, who continue.

The Labour Market

Board of Trade Labour Returns for January.

The Board of Trade returns for January state that employment in the building trades continued dull throughout the month, and was seriously affected by bad weather. Compared with a year ago, no general change was shown by the returns, but employment was noticeably better with carpenters and joiners and plumbers.

The Returns.

Returns received from firms employing 54,011 work-people at the end of January showed an increase in the numbers employed of 768, or 1·4 per cent., compared with a month ago. The figures for December, however, were affected to some extent by the Christmas holidays.

The returns show that there was some increase in the number of workpeople employed in most districts, but a decline in Scotland and the Northern Counties group.

Employment was dull in all branches of the building trade except plumbing. Compared with the end of December, a slight improvement was shown by carpenters, plumbers and plasterers, whilst in Scotland a decline was reported by masons and slaters. Compared with a year ago, employment showed an improvement with carpenters, plumbers and slaters, while masons in Scotland reported a decline. Bricklayers and painters reported no general change compared with either a month ago or a year ago.

Percentage of Unemployed.

The percentage unemployed of trade union carpenters and joiners in the United Kingdom at the end of January was 8·2, as compared with 8·6 a month ago, and 10·1 a year ago. The percentages unemployed of trade union plumbers for the same periods were 6·7, 7·5 and 12·1 respectively.

The following table summarises the returns received:—

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Workmen.	Labourers.	Lads and Boys.	Total.
London	10,990	7,489	749	19,228
Northern Counties and Yorkshire ...	3,225	3,065	800	7,090
Lancashire and Cheshire	4,252	3,176	1,111	8,539
Midlands and Eastern Counties...	2,581	2,063	438	5,082
S. & S.W. Counties and Wales	3,061	2,192	605	5,858
England & Wales ...	24,109	17,985	3,703	45,797
Scotland	3,401	2,049	1,007	6,457
Ireland	877	789	91	1,757
United Kingdom ...	28,387	20,823	4,801	54,011

London.—Employment was dull generally. From trade union returns relating to carpenters and joiners in the London district it appears that 10·3 per cent. were unemployed at the end of the month, against 9·8 a month ago, and 11·5 a year ago. For plumbers the percentages were 11·4, 12·5 and 15·2 respectively. Bricklayers, plasterers and painters reported no change in employment compared with a month ago. Compared with a year ago plasterers reported a slight improvement and painters a slight decline.

Northern Counties and Yorkshire.—Employment was dull generally, severe weather seriously hindering operations.

Lancashire and Cheshire.—Employment was dull on the whole. It was moderate, however, with carpenters and joiners at Manchester, with carpenters, bricklayers and plumbers at Oldham, and with plumbers, plasterers, painters and slaters at Bolton.

Midland and Eastern Counties.—Employment was slack on the whole, but moderate with plumbers. It was also moderate with carpenters at Coventry, and at Walsall a general improvement was reported. Painters at Birmingham and Leicester reported employment as worse than a month ago.

Southern and South-Western Counties and Wales.—Employment continued dull generally. As in other districts, building operations were seriously interfered with by severe weather. At Plymouth employment was worse on the whole than in December.

Scotland.—Employment was fair with plasterers and moderate on the whole with carpenters and plumbers. With bricklayers, masons and painters it was slack.

Ireland.—Employment was dull generally, except with plumbers at Dublin, and masons at Belfast, and Cork, who were fairly well employed.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen	8	—	8	8	8	8	8	4½–5
Accrington	9	9	8½	9	7½	8½	—	5–5½
Ashton-under-Lyne	9½	10	9	10	8¼	9	8½	5½–6½
Barnsley	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness	9	9	8¾	9	9	8¼	8¼	6–6½
Bath	7½	7½	7½	7½	7½	6½ 7½	6½	5–5½
Belfast	8½	8½	8½	8¾	8	8½	8½	19s.wk
Birkenhead	9½–10	9½	9½	9½	9	—	8½	5–6½
Birmingham	10–10¾	9½	9½	10	9	9½	8½	6½–7
Blackburn	9½	10	9	9	9	9	8	5½–6½
Blackpool	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton	9½	10	9½	10	9	9	8½	6–7
Bournemouth	8	8	8	8	8	8	7½	5½
Bradord	9	9	8½	8½	9	9	8	6–6½
Brighton	9	8	8	8	8	9	7	5½
Bristol	9	9	9	9	9	9	8½	6
Burnley	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury	9½	10	9½	9	9	9	8½	5–6½
Cambridge	8½	8	8	8½	8	8½	6½	5–5½
Cardiff	9	9	9	9	9	9	8½	5½
Carlisle	8½	8½	8	8	9	8	8	5–5½
Chatham	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie	9½	9½	9	9½	9	8½	9	6
Colchester	8	8	8	9	8	9	6 6½	5–5½
Cork	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3⅝
Coventry	9½	8¾	9	9	9	9	8	6
Crewe	8½	8	7	9	8	8	7	5–6
Darlington	9	9	8½	9	9½	8	7½	6
Darwen	9½	9½	9	9	9	9	8¼	6
Derby	9	9	8½	9	9	8½	7½	5½–6
Dublin	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley	8½	8	8	8½	8	8	7	5½
Dundee	8½–9	10	9	8½	8½	9	8½	5¼–5½
Eastbourne	8½	8	8	9	pce.	8	7½	5½
Edinburgh	8½	9½	9	—	—	9	—	—
Exeter	8	8	7½	7½	7½	7½	6½	5
Glasgow	—	9½	10	9½	9	9	9	5½–6
Gloucester	7½	8	8	7½	7½	8	7½	5
Greenock	9½	10	9	9½	9½	9	9	5½
Grimsby	—	9	8	9	pce	—	7½	6–7
Halifax	9	9	8¼	8½	8½	8½	7½	6
Hartlepools	9½	9	9½	9½	—	—	—	6½–7½
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield	9	9	8½	8½	9	7½ 8	7½	6
Hull	9¼–9¾	9	9	9	9	9	8	6½–7
Ipswich	8	8	8	9	9	8	6½	5½
Keighley	8½	8½	8	7½	8½	7½	7½	6
Lancaster	9½	10	8½	9	9	8½	8½	5½–6
Leeds	9½	9½	9	9½	9	9	8	6½–7
Leicester	9	9	9	10	9	9	8	6½–7
Leigh	9½	9½	9½	9	8½	9	8	6–6½
Lincoln	8½	8	8	9	8	8	7	5–6
Liverpool	9½–10	9½	9½	9½	9½	9½	8½	5–6
London	10½	10½	10½	11	—	11	—	—
Londonderry	7	7	7	7	6½	7	7½	15s.wk.
Macclesfield	8	8	8	7¾	6½	7½	7½	5
Manchester	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	9½	9	8	6¼–6¾
Newcastle	9½	9	9½	9½	9½	9	8½	6¼
Newport(Mon.)	8½	8½	8½	8½	8½	8½	7½	5½
Northampton	8½	8½	8½	8½	—	8½	7½ 8	5½
North Shields	9½	9½	9½	9½	9½	9	9	6¼–6½
Norwich	9	9	8½	9	9	8½	7½	5–6
Nottingham	9½	9	9	10	9	9	8½	6½
Oldham	9½	10	9½	9	8½	9	8½	5½–7
Oxford	8½	8	8	8	8	9	7	5½
Paisley	9	9½	9	9½	9	9½	9	6
Perth	8	10	8	8	8	8	7½	5½–6
Plymouth	8	8	8	8	8	8	7	5
Portsmouth	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham	9½	9½	8½	8½	8	8½	7½	6
St. Helens	9	9	9	9	9	8½	8¼	5½–6
Scarborough	8½	8½	8	8½	30s. wk.	8	7½	6
Sheffield	9½	9½	9	9	9	9	7½	5½–6½
Southampton	7½	8	8	8	pce.	8	7	5
Southport	9	9	8¾	9	9	9	8½	6
South Shields	9½	9½	9½	9	9½	8¾	8½	6¼
Stockport	9½	9½	9	10	9	9	—	6–7
Stockton-on-Tees	9	9½	9¼	9½	9½	9	8	6¼–6½
Sunderland	9½	9½	9¼	9½	9½	37s. wk.	9	6¼
Swansea	8½	—	8½	8½	—	8½	7½	5½
Torquay	7	7	7½	7	7	7	7	4½–5
Wakefield	9	8½	8	8½	8	7½	7½	6
Walsall	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington	8¾	9¼	9¼	9½	8½	9¼	—	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan	9½	10	9	9	8½	9	8½	5½–7
Wlverhampton	9	9	9	8½	8½	9	7½	6–6½
Worcester	8½	8½	8½	8½	8½	8½	7	5½
Yarmouth	7½	7½	7½	A	7½	7½	6	4½

A. Done by bricklayer.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans	per qr.	1	11	0	1	14	0
Clover, best...	per load	4	7	0	4	17	6
Hay, good	do.	4	0	0	4	5	0
Sainfoin mixture	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

MISCELLANEOUS.

		£	s.	d.	£	s.	d.
Bricks Stocks, d/d to job	per 1,000	1	16	0		—	
Do. Flettons on rail ...	do.	1	6	0		—	
Do. Pressed Wire Cuts, d/d to job ...	do.	1	18	0		—	
Do. Blue brindled wire cuts	do.	1	3	0		—	
Do. do. wire cuts ...	do.	1	7	0		—	
Do. do. pressed facings	do.	1	18	0		—	
Coke Breeze, into carts at gasworks ...	per load	0	2	0		—	
Do. d/d to job	do.	0	4	0		—	
Sand	per yard	0	7	6		—	
Ballast	do.	0	6	6		—	
Cement	per ton	1	13	0		—	
Lime	do.	1	4	0			
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds	per sq. ft.	0	0	3½		—	
Do. do. do. do. 3rds.	do.	0	0	2½		—	
Do. do. do. 21oz., 2nds.	do.	0	0	5		—	
Do. do. do. do. 3rds	do.	0	0	3½		—	
Do. do. do. 26oz., 2nds	do.	0	0	6		—	
Do. do. do. do. 3rds	do.	0	0	4¼		—	
Do. do. do. 32oz., 2nds	do.	0	0	8		—	
Do. do. do do. 3rds	do.	0	0	6		—	
Do. English patent plain rolled plate in stock crates ⅛	do.	0	0	2		—	
Do. do. do. 3⁄16	do.	0	0	2¼		—	
Do. do. do. ¼	do.	0	0	2½		—	
Granite Chippings ...	do.	0	10	6		—	
Do. do. ¼in. ...	do.	0	11	6		—	
Do. Broken, 1½in. ...	do.	0	15	6		—	
Do. do. 2in. ...	do.	0	15	0		—	
Do. do. 2½in. ...	do.	0	14	6		—	
Do. Kerb, Norwegian 6×12 and 12×6 in river	per foot	0	1	2		—	
Do. do. do. circular	do.	0	1	5		—	
Do. do. do. 12×8 in river	do.	0	1	5		—	
Do. do. do. circular	do.	0	1	8		—	
Do. do. Guernsey 6×12 in river	do.	0	1	4		—	
Do. do. do. circular	do.	0	1	6		—	
Do. do. do. Specia 4×6	do.	1	11	0		—	
Do. do. Guernsey, 3×6	do.	1	10	0		—	
Do. do. do. 3×7 & 3×9	do.	1	8	6		—	
Do. do. do. 3×5	do.	1	10	0		—	
Castor Oil, French ...	per cwt.	1	9	0		—	
Colza Oil, English ...	do.	1	11	9		—	
Copperas	per ton	2	0	0		—	
Lard Oil	per cwt.	2	15	0	2	17	0
Lead, white, ground, carbonate	per ton	16	0	0		—	
Do. red	do.	15	0	0	19	0	0
Linseed Oil, barrels ...	per cwt.	1	2	3		—	
Petroleum, American ...	per gal.	0	0	6¾	0	0	6⅞
Do. Russian ...	do.	0	0	6¼	0	0	6⅜
Pitch	per barrel	0	12	0	0	13	0
Shellac, orange	per cwt.	10	13	0	10	14	0
Soda, crystals	per ton	3	2	6	3	5	0
Tallow, Town	per cwt.	1	15	0	1	15	6
Tar, Stockholm	per barrel	1	5	0		—	
Turpentine	per cwt.	2	10	9		—	

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	109	0	0	110	0	0
Do. Strong sheets ...	do.	124	0	0	125	0	0
Lead, soft foreign	do.	19	12	6	19	15	0
Do. English	do.	19	17	6	20	0	0
Do. pipes...	do.	23	5	0	23	7	6
Do. sheets	do.	22	15	0	22	17	6
Galvanised Corrugated sheets	do.	14	0	0	14	2	6
Spelter G. M.	do.	26	0	0	26	2	6
Angles, Scotland	do	7	2	6	7	5	0
Bars, do.	do.	7	17	6	8	0	0
Marked bars, Staffs. ...	do.	9	0	0	9	2	6
Common bars, do. ...	do.	7	7	6	7	10	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	15	0	6	17	6
Angles, Midlands	do.	7	0	0	7	2	6
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	191	0	0	192	0	0
Do. English ingots ...	do.	194	0	0	195	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

SOFT WOODS.

		£	s.	d.	£	s.	d.
Fir, Dantzic and Memel	per load	3	10	0	5	0	0
Pine, Quebec, Yellow ...	do.	3	12	6	6	5	0
Do. Pitch, American ...	do.	4	7	6	5	0	0
Laths, log, Dantzic	per cu. fath.	4	0	0	6	0	0
Deals, Archangel, Yellow, 2nd, 3×9	per std.	17	0	0		—	
Do. do. do. 3rd, 4×9	do.	12	15	0		—	
Do. do. do. do. 3×9	do.	10	15	0		—	
Do. do. do. do. 2½×9	do.	11	5	0		—	
Do. do White, 2nd, 3×11	do.	12	0	0		—	
Do. Christianssand, Yellow, unsorted. 3×4	do.	8	0	0		—	
Do. Kovda, Yellow, 4th, 3×8	do.	9	15	0		—	
Do. Langror, Yellow, 5th, 3×11	do.	9	0	0		—	
Do. Lugnvik, Yellow, 3×9	do.	6	12	6		—	
Do. Lappvik, Yellow, unsorted, 3×4	do.	9	5	0	9	10	0
Do. Mesane, Yellow, 3rd, 3×9	do.	10	5	0	10	10	0
Do. Norrkoping, Yellow, 1st, 3×11	do.	11	0	0	11	10	0
Do. do. do. 2nd, 4×9	do.	9	10	0		—	
Do. Onega, Yellow, 3rd, 3×8	do.	11	0	0		—	
Do. do. do. do 3×7	do.	11	0	0		—	
Do. Quebec, Spruce, 1st, 3×8	do.	12	5	0		—	
Do. Riga, White, unsorted, 2½×7	do.	7	10	0		—	
Do. St. Petersburg, White, 3rd, 3×9	do.	9	0	0		—	
Do. do. do. do. 3×7	do.	8	5	0		—	
Do. Sandviken, Yellow, 4th, 3×9	do.	9	15	0		—	
Do. Sornas, Yellow, unsorted, 2½×7	do.	8	0	0	8	5	0
Do. Trangsund, Yellow, unsorted, 2½×7	do.	9	5	0		—	
Do. Umba, Yellow, 3rd, 3×9	do.	11	0	0	11	5	0
Battens, Archangel, White, unsorted, 2×8	do.	8	15	0		—	
Do. Christianssand, Yellow, unsorted, 2×4	do.	8	10	0		—	
Do. Fredrikshamn, Yellow, unsorted, 2×3½	do.	8	15	0		—	
Do. Hernösand, White, 2×4½	do.	6	15	0		—	
Do. do. do. 2×5½	do.	6	5	0		—	
Do. Kovda, Yellow, 3rd, 2×8	do.	10	0	0		—	
Do. Lugnvik, Yellow and White, 2½×5	do.	6	15	0		—	
Do. Lappvik, Yellow, unsorted, 2×5	do.	9	10	0	9	15	0
Do. Norrkoping Yellow, 1st & 2nd, 2×4½	do.	8	10	0		—	
Do. Ned-rkalix, Yellow, 3rd, 1×9	do.	9	10	0		—	
Do. Porsgrund, Yellow, unsorted, 2×4	do.	8	15	0		—	
Do. Raumo, White, unsorted, 2×3½	do.	8	5	0		—	
Do. St. Petersburg, Yellow, 3rd, 2×6	do.	8	15	0		—	
Do. do., Yellow, unsorted, 2×5	do.	8	0	0		—	
Do. do White, unsorted, 2×7	do.	8	10	0		—	
Do. do. do. unsorted, 2×5	do.	8	0	0		—	
Do. Sandarne, Yellow, 2nd, 1¼×9	do.	13	0	0		—	
Do. Storsfors, Yellow, 2nd, 2×7	do.	9	5	0		—	
Do. do. do. do. 2×4	do.	9	15	0		—	
Do. do. do. 1st & 2nd, 2×4	do.	8	15	0		—	
Do. do. do. do. 2×3	do.	8	15	0		—	
Do. Skonvik, White, unsorted, 2×4	do.	8	10	0	8	15	0
Do. Wasa, Yellow, 1st & 2nd, 2×6	do.	9	0	0		—	
Do. do. do. do. 2×5	do.	8	10	0		—	
Do. do. do. do. 2×4½	do.	8	10	0		—	
Do. do. do. do. 2×3	do.	9	0	0		—	
Flooring Boards, Fredrikstad, Yellow, 3rd, 1×7	do.	0	9	9		—	
Do. do. Mixed Yellow, 1×6½	do.	0	9	6		—	
Do. Gefle, Yellow, 3rd, Do. do. do. do. 1×7	do.	0	10	6		—	
Do. Mon, Yellow, 1st, Do. do. do. 2nd, 1¼×5	do.	0	13	0		—	
Do. do. do. do. 1×7	do.	0	12	0		—	
Do. do. do. do. 1×6½	do.	0	11	0		—	
Do. do. do. do. 1×6	do.	0	11	3		—	
Do. do. do. do. 1×5	do.	0	9	6	0	9	9
Do. do. do. 3rd, 1¼×7	do.	0	12	9		—	
Do. do. do. do. 1×7	do.	0	10	9		—	

HARD WOODS.

		£	s.	d.	£	s.	d.
Ash, Quebec	per load	4	2	6	7	5	0
Birch, New Brunswick ...	do.	2	7	6	5	0	0
Do. Quebec	do.	2	7	6	5	0	0
Box, Turkey	per ton	6	0	0	18	0	0
Cedar, Cuba	per ft. sup.	0	0	4	0	0	5
Do. Honduras	do.	0	0	4	0	0	5½
Do. Tobasco	do.	0	0	5⅝		—	
Elm, Quebee	per load	4	0	0	9	5	0
Jarrah, planks	per ft. cu.	0	2	6	0	3	0
Mahogany, Average Price for Cargo, Honduras	per ft. sup.	0	0	4½	0	0	5½
Do. Tobasco ...	do.	0	0	4½	0	0	5½
Do. Cuba ...	do.	0	0	4½	0	0	6
Do. African ...	do.	0	0	3¾	0	0	5½
Do. Lagos ...	do.	0	0	4	0	0	5½
Oak, Wainscot	per log	2	5	0	5	10	0
Teak, Indian, logs ...	per load	9	5	0	20	0	0
Do. do. planks ...	do.	13	5	0	21	0	0
Whitewood, American, logs	per ft. cu.	0	1	3	0	1	6
planks and boards ...	do.	0	1	3	0	3	9

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THE BUILDING TRADES' EXHIBITION.

A Guide for Visitors.

As already announced in our columns, the Building Trades' Exhibition will be opened on Saturday at Olympia by the Rt. Hon. the Lord Mayor, Sir William Treloar.

The exhibition will be of particular interest this year, as it is even more representative than on previous occasions, the whole of the available space being occupied. We have considered that it would be of some service to obtain early particulars of the exhibition, and we are now able to give readers what is practically a guide to the principal exhibits. Next week we shall give an account of the opening of the exhibition, together with full descriptive particulars and illustrations of the stands.

On our centre plate we publish a plan of the main hall showing the position of each exhibitor, while on the next page is given a plan of the annexe. These, we think, will be especially appreciated.

CONCRETE AND STEEL, AND FIRE-RESISTING CONSTRUCTION.

Reinforced concrete construction has come so much to the front within recent years that we think the exhibits of this nature will receive a special amount of attention.

Some applications of Kahn bars for reinforced concrete construction will be shown at special position No. 13. The Trussed Concrete Steel Co.'s system, having established itself in the United States, has latterly been finding a place for itself in this country. It will be familiar to the majority of architects. Those who have already seen it will doubtless take special interest in this stand, while those to whom the system is fresh should not miss the opportunity of here seeing it.

Messrs. Richard Johnson, Clapham, and Morris, Ltd., of Manchester and London (Mr. Percy Tomey, consulting engineer), will show Johnson's wire-lattice system of reinforced concrete construction, as applied to floor and roof slabs, beams, columns, staircases, &c., &c.; also Johnson's galvanized metal lathing and plaster partitions, and steelwork encasing, and Johnson's wire lattice and wire-work, as applied to builders' ballast, sand, and lime screens, plasterers' sieves, builders' riddles, lift enclosures, window guards, &c. The stand is No. 83, row D.

The Patent Indented Steel Bar Co., Ltd., have arranged their stand (No. 228, row Q, annexe) to show specimens of their bar to the best advantage. In the centre will be a specially-constructed case displaying about 60 photographs of structures in different parts of the world in which indented bars have been used. These photographs will be transparent, and lighted from behind; there will also be a short description of each plate at the side. In addition, models of different works will be exhibited—namely, a reservoir, sewer, retaining wall, tunnel, culvert, bridge, beam, &c. One of the most interesting exhibits, however, will be a portion of a floor which was constructed for testing purposes for the British Fire Prevention Committee, and withstood their tests in such a manner as to obtain the highest classification as a fire-resistant.

The New Expanded Metal Co., Ltd., have erected a small structural steelwork building, in which they will show their systems of flooring, roofing, walling, partitioning, suspended ceilings, steelwork encasing, &c. There will also be shown a short length of buttressed retaining wall, and a short length of conduit or sewer; while included in the exhibit will be a few samples of expanded metal made-up goods, such as lockers, builders' screens, fencing, baskets, &c. This stand occupies special position No. 4.

The Columbian Fireproofing Co., Ltd., will occupy special position No. 9. Here the chief feature will be a raised structure showing methods of floor and roof construction on the "Columbian" system of reinforced concrete. The type of floor shown is known as a panelled floor, and is constructed across a 16ft. span between two rolled steel joists supported by columns, the 3½in. "Columbian" reinforcing bars being suspended by patent steel stirrups over top flanges of joists, and embedded in 6in. thickness of concrete. The superstructure carried by the floor shows a mansard roof surmounted by a dome, and with dormers of various shapes at the sides, the reinforcing and trimming for the whole of the roof, dome and dormers being "Columbian" bars of various sections from 3½in. to 1in. in size. To those who have had no previous experience of the "Columbian" system of reinforced concrete construction this exhibit will afford a good example of its adaptability to the construction of any type of floor, roof, &c., the construction being both simple and economical. The method of casing the joists and columns is also well illustrated. In addition to the above, the Columbian Co. will show several samples of the "Bonna" armoured cement pipes. These pipes can be designed to withstand any pressure, from high internal pressure to atmospheric pressure; they have recently been laid at Swansea to withstand 200ft. head pressure, and have been successfully tested up to 400ft. head pressure. Various slabs, bars, stirrups, &c., are also included in the Columbian Co.'s exhibit.

Stand No. 82, Row D, will be occupied by the Kleine Patent Fire-resisting Flooring Syndicate. Here will be shown how bricks of rectangular shape can be used for constructing floors and roofs, of wide spans, also staircases; a floor and flat roof, both of a clear span of 12ft., absolutely horizontal, without any arch, while the sides will be two sloping roofs, the one built horizontally with a clear span of 12ft., and the other built up with the span sloping upwards, a clear span of 8ft. On the flat roof is a skylight, without trimmers, showing that the resistance of this construction does not suffer by openings of considerable dimensions being cut through it. For the same reason, it is a simple matter to build dormer windows into the sloping roof; in the horizontal roof a dormer window will be shown without any trimmers or supports, other than given by the roof itself. Mr. J. F. Kleine, of Berlin, the original inventor and patentee of this ferro-brick construction, is a permanent director of the English syndicate, which is rapidly gaining the same success in this country as the "Kleine" construction has done on the Continent.

The stand of Messrs. D. G. Somerville and Co. (special position No. 24) will have a steel frame—a reduced replica of the upper portion of a steel-frame building with reinforced concrete floors and roofs erected by the firm at Paddington for the National Telephone Co. There will also be exhibited at this stand two forms of fire- and sound-resisting flooring, the one having rolled steel joists in combination with reinforced concrete tiles (this being the firm's standard type of construction), and the other an entirely new form of reinforced concrete flooring, for which protection has been applied. Another exhibit will be Mr. Cooper Pooles' patent reinforced concrete pile, as being constructed and employed by the firm in the reconstruction of the reinforced concrete wharf at the Town Quay, Southampton. There will also be models illustrating the use of the system for the protection of existing timber piles and steelwork.

The stand of the Associated Portland Cement Manufacturers (1900), Ltd., special position No. 16, is sure to receive a good deal of attention, both from the prominence which this company occupies in the building world and the excellence of the exhibit. The brands of cement manufactured by the various factories now owned by this company, including "J. B. White & Bros.," "Hilton Anderson," Francis, "Nine Elms," "Knight, Bevan, and Sturge," "Eddystone," &c., are familiar to the building and allied trades throughout the kingdom, and need no comment here. The exhibit will show the raw material employed in the production of Portland cement, samples of these materials in stages of manufacture, as slurry, clinker from various kilns, and finished cement of varying fineness; while a booklet printed for distribution at the exhibition describes the processes through which these materials pass. An interesting feature of the stand will be the practical demonstrations of testing that are to be carried out daily. A complete apparatus for making and testing briquettes in conformity with the British Standard Specification has been installed, and the expert testers from the company's staff will doubtless have a busy time in what should prove to be a very instructive and popular exhibit. A series of excellent photographs cover the columns of the stand, and afford an opportunity of showing the many notable buildings and works on which the company's cement has been used.

An important stand is that of the Saxon Portland Cement Co., Ltd. (No. 184, row L, annexe), a firm which supplies enormous quantities of cement at the present time, and their special brand "Fer-Rock" cement is finely ground and of the best quality suitable for reinforced concrete. In view of the attention which this system of construction is at present attracting the efforts of manufacturers to produce improved qualities of cement should be closely watched, and no doubt architects visiting the exhibition will take special note of the exhibits and information to be obtained at this stand.

In the concrete section of the exhibition no one should miss the stand of the Improved Construction Co. (No. 79, row D). This firm manufactures moulded concrete in all its various forms by a special process which gives great strength, and rapidity and economy in execution. As regards the essential features of the process we may say that the moulds are placed on a special form of shaking table which causes the aggregates to wedge themselves together, thus securing great compactness of structure.

At the Fireproof Company's stand (special position No. 14) dovetail corrugated steel sheeting for partitions, ceilings, floors, casings to girders, &c., will be shown; also the firm's dovetail corrugated steel sheet damp-course in conjunction with neat cement. Other exhibits will be the "Camjud" partition slabs.

BRICK WALLS AND PARTITIONS.

There can hardly be anything particularly new to see in bricks, but the increasing demands for glazed work will direct attention to the numerous exhibits of this kind, especially to those of Messrs. Stanley Brothers, Ltd., the well-known Nuneaton firm. Glazed bricks will constitute the chief feature of their exhibit, numerous shades of green, brown, buff, &c., being shown at their stand (No. 89, row D).

Messrs. Thomas Pascall and Sons (stand No. 108, row F) will have a small building erected with their "Wrotham Red" bricks, and roofed with "Wrotham Red" tiles. These are of particularly good quality.

A small building, erected with handmade sand-stock facing bricks, relieved with white rough-cast, and covered with hand-made sand-faced roofing tiles, with varieties of bricks and tiles at the front—this will be the exhibit of Messrs. G. Tucker and Son, Ltd., at stand No. 111, row F. An interesting feature will be some tiles made by the Romans from the same bed of clay, and by the same process, as the firm now employ. These Roman tiles have been lying buried for centuries in wet earth, and so far from showing any signs of decay, there is to be seen the clear impress of a thumb that was most evidently made at the time of their manufacture.

Bricks and brickwork will be the exhibit of Messrs. Thomas Lawrence and Sons, of Bracknell, at stand No. 46, row B. There will be shown a gauged and carved pilaster, cut from the firm's rubber bricks, and executed by students of the Tottenham Polytechnic; two cambered and one flat arch, cut from similar bricks, and executed by students of the Wimbledon Polytechnic; two gauged and carved pilasters, executed by students of the Battersea Polytechnic; and numerous specimens of facing bricks, some having been made by the firm for use in country houses, having the quality of old brickwork. Special attention is also directed to some machine-pressed bricks.

Several interesting novelties will be shown at stand No. 144, row H, by the "Clipper" Belt Hook Co., of Manchester. First may be mentioned the "Anchor" patent wall-tie—an improved tie for all kinds of brickwork, glazed or otherwise, and obtainable in all sizes, for cavity or solid work. Then there will be the "Eesyfixt" gate hangers, for building into walls. Another exhibit will be the "Clipper" belt lacing tool and hooks, this patent fastener being as smooth and pliable as an endless joint, and combining maximum advantages with minimum cost; also the "Clipper" belt shifter, for fixing tools on pulleys while in motion, without danger to the person using it; "Clipper" girder clips, for attaching electrical tubes; and the "Clipper" plank clamp, an automatic device for extending two or more scaffolding planks.

The Hempstead Patent Brick Co. will have an exhibit of special interest from the fire point of view. At this stand (No. 64, row C) will be shown a floor of hollow fireproof blocks, supported by steel joists, with a patent fire-resisting door in the partition dividing the stand. Samples of the firm's materials, in all thicknesses, from 1¼ins. to 4½ins., will also be shown.

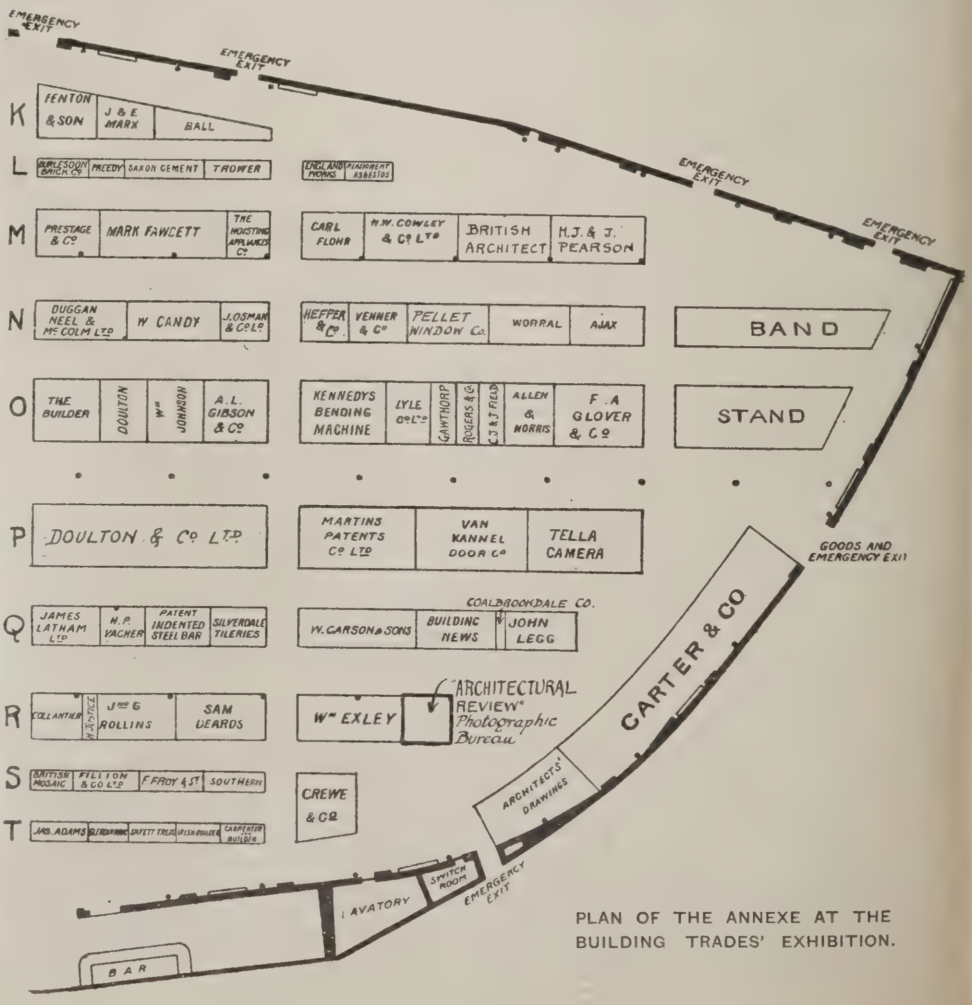
The Frazzi Fireproof Construction, Ltd., will exhibit at stand No. 48, row B. Here they will show partitions plastered halfway up, and a floor supported on two steel joists—all in Frazzi terra-cotta construction—with a staircase arranged so that the top of the floor can also be examined, as well as the under side. A new brick partition made by Messrs. J. Brown (London), Ltd., will also be shown at this stand. The slabs are hollow and are so made that they will hold nails firmly at every part of the surface.

Fire-resisting partition bricks are exhibited by Messrs. Jabez Thompson & Sons, as well as a new form of fire-resisting floor construction made from the same clay as the partition bricks, which, it should be noticed, very successfully passed through one of the most severe tests conducted by the British Fire Prevention Committee. They are also showing a special make of partition blocks of plaster composition.

The well-known "Mack" fireproof blocks for partitions, ceilings, pugging, floors and roofs are being shown by Messrs. J. A. King & Co. at stand No. 88, row D. The pugging blocks laid on fire-resisting bearers between joists for fireproofing projecting shop roofs are a special feature.

Partitions composed of Portland cement and breeze slabs will be shown by the Acton Concrete Partition Co. at stand No. 106, row F. These slabs are 16ins. by 10ins., with a thickness of 2ins., 3ins., or 4ins., and are easily fixed.

A very interesting exhibit will be that of the patent "Corkstone" insulator—"Reform" and "Emulgit" brands—shown at stand No. 135, row H, by Messrs. Chittenden and Co., who are the sole agents for this material. The lining of



PLAN OF THE ANNEXE AT THE BUILDING TRADES' EXHIBITION.

an attic with patent "Emulgit" will be illustrated. This material is an excellent insulator as well as a fire-resistant, and in comparison with lath and plaster it has many advantages, especially for those places which are subjected to extreme heat and cold. It renders rooms cold in summer and warm in winter. There will also be shown at this stand a model cooling-room insulation, with "Corkstone" applied to walls and ceiling; also an exhibit of a "Corkstone" intermediate wall, the lightness of the material allowing of its erection without reinforcing by traverses of any form of ceiling construction; while still another application of the material will be shown for damp walls, which are so troublesome to remedy.

SHEET ROOFINGS.

Vulcanite has come so extensively into use for roofing purposes that visitors will be particularly interested in this exhibit (stand No. 94, row E), especially as a model will be shown to demonstrate how the roofing is laid: in addition, the roof of the stand will be formed as a water-tank and access given to it by a spiral stairs, so that the application of Vulcanite for this purpose can be thoroughly illustrated. There will also be exhibited samples of Vulcanite sheet asphalts for damp-coursing, and for sloping roofs of farm buildings, sheds, brick kilns and other buildings of a similar nature, these sheet asphalts for sloping roofs being distinct from the firm's patent Vulcanite roofing for flat roofs.

The Ruberoid Co. will show their well-known sheet roofing "Ruberoid" and as well as other applications of the material to such purposes as damp courses. "Ruberoid" has been extensively adopted for the covering of flat roofs, which are now so customary in modern buildings, particularly for a number of large reinforced concrete buildings. The exhibits at this stand are, therefore, worthy of note, as illustrating a branch of modern scientific building construction that it is necessary for any up-to-date practitioner to be familiar with.

STONE.

The Excelsior Patent Stone Co., of Northamptonshire, will have a stand (No. 90, row D) with the floor laid with several varieties of "Excelsior" stone flags, some being of plain type, as in footways, &c., others of octagonal shape, suitable for school lobbies, terraces, chapel floors, &c.; while another variety is suitable for the paving of stables and cow-houses; also flooring tiles for kitchens, sculleries, &c. Another exhibit at this stand will be the "Excelsior" stone kerb and combined kerb and channel, as supplied to many county, urban, and rural district councils, and there will also be shown the L.C.C. regulation spandrel step and numerous other exhibits illustrating the adaptability of "Excelsior" patent stone.

PAINTS AND COLOURS.

The exhibits of paints and decorative materials are always among the most prominent at the exhibition. This will be the case again at the present exhibition.

Special position No. 7 will be occupied by Messrs. Pinchin, Johnson and Co., Ltd., the stand being a double one, showing a staircase beautifully enamelled with "Satinette," while the other part is devoted to displaying "Minerva" paint. Visitors should make a special point of carefully looking at this exhibit, as the enamel and paint work shown is of excellent quality.

Messrs. Walter Carson and Sons will have a good exhibit of their "Vitrolite" paint, in two shades, white and light stone colour, which has been a great success since placed on the market; compared with white lead, it is greatly superior in colour, covering power and durability; the nature of its manufacture renders it practically impervious to moisture, heat, and cold; in conjunction with it, the firm strongly recommend the use of their "Plastine," the "imperishable putty," particularly for horticultural work. Messrs. Carson will also exhibit their liquid paints, in 42 shades, as well as "Japolite," a perfect Japan of great elasticity, brilliancy, and durability, while varnishes and varnish stains, and dry colours will also be in great prominence. There will be bath enamels, too, and "Muraline," an excellent washable water paint, which has been on the market for some years now. The stand is in the annexe, No. 230, row Q.

The well-known "Velure" japan paint made by Messrs. C. Chancellor & Co. is to be shown at their stand, as also their special thinner and other manufactures, such as varnishes, a floor paint, a cycle enamel, a damp preventative and a stone preservative. Finally, we must note "Fumood," a special preparation for darkening wood as a substitute for fuming.

Paints and enamels will also be shown by Messrs. R. Gay & Co., at stand No. 129, row G.

At stand No. 242A, row R, annexe, Mr. Howard R. Justice, M.I.M.E., will show "Flexible Compound." This is an oil product which is extremely flexible, and an excellent "binder." It is not a paint nor a varnish, but, mixed with either, overcomes disintegration and prevents chalking, peeling, and cracking: it also improves the finish, and increases the life. Its most important quality, however, is in rendering new iron, steel, &c., immune from the oxidizing effect of moisture, the fumes from locomotives, &c., thereby making them absolutely rust-proof. Flexible compound is also used for steam joints, &c. Another exhibit of this stand will be Hayes' patent sheet-steel fire-resisting lathing, and particulars will be obtainable of Chambers' brick-making machinery.

Another paint exhibit will be that of The Silicate Paint Co. (J. B. Orr and Co., Ltd.), at special position No. 15. This firm manufacture the well-known water-paint, "Duresco." Hitherto, they have confined their exhibit to examples of "Duresco" treatment on panels, demonstrating the softness and solidity of the material as a plain wall treatment, and its adaptability as a high-class decorative medium; but this year, in addition, will be shown a full-sized bungalow decorated throughout with "Duresco."

Hall's Distemper stand, No. 91, row D, will attract the eye, being in the form of the week-end cottage which was designed for Messrs. Oetzmann & Co. by Mr. W. H. White, F.R.I.B.A., and which created considerable interest a short time ago. There will be "green-felt" grass round about the stand, and the garden furniture thereon will show the quality of Sissons' well-known "Griffen and Shield" enamels. The front of the cottage, of stucco and rough-cast, will be treated with Hall's distemper, which is extensively used for such purposes, having great weather-resisting properties, and being extremely clean. Over the entrance to the cottage is a trellis porch in green and white, the former being in "Aperfectol" paint and the latter in "Sisco" white japan. The entrance door, with leaded lights, is decorated with a new enamel called "Orientolac," the latest introduction of Messrs. Sissons Brothers; while within the cottage the rooms will show treatments of Hall's distemper in several colours, with some of the artistic stencil designs now sold to the trade for use with this distemper.

"Coatostone"—a "liquid stone" for covering all surfaces—will be exhibited at Stand No. 59, row B, by the Coatostone Co.; the stand itself, a wooden structure, being treated with this solution, to show how close an imitation of real stonework it is. "Coatostone" is applied like a paint, and is applicable for external and internal work, being especially useful for renovating stonework which has become dirty by exposure. At this stand, also, there will be a cottage front, the upper part partly timbered and partly filled with rough-cast (which is another speciality of this company), and the lower portion built up of woodwork and asbestos sheets, treated with "Coatostone," while the interior of the cottage will display a washable distemper called "Sandisco."

Major & Co., Ltd., of Hull, will again supply a picturesque addition to the exhibition, demonstrating the advantages of their wood-preserving stain, "Solignum." This year they have erected a four-roomed wooden bungalow (special position No. 1), the woodwork inside and out being treated with "Solignum" in various shades and colours, plain and with beeswaxed and varnished surfaces.

LIFTS.

At Stands Nos. 77 and 78, row D, Messrs. R. Waygood and Co., Ltd., will show an electric passenger lift complete, working in a wrought-iron structure provided by Messrs. Richard Moreland and Son. There will also be an automatic electric passenger lift controlled by buttons in the car corresponding to the floors through which it travels, and one on each landing to call it; in this lift the gates are fitted with a mechanical and electrical locking device, ensuring that all gates are closed before the lift is set to work. Another exhibit will be a model of a hand-power service lift, shown working with the ordinary endless hauling rope, fitted with band brake; also a special hand-power lift, working with handle below, and fitted with gunmetal cage guides and round iron runners, the whole arrangement made to a special design. (The particular feature of this lift is its extreme quietness, on account of which it is very largely adopted in private houses.) Still another exhibit at this stand will be an electric friction hoist, geared direct to friction gear, suitable for builders during building operations, ordinary warehouse work, &c.

The well-known firm of Carl Flohr will have an interesting exhibit at stand No. 194, row M, annexe. Here will be shown a small electric lift with patent push-button control, showing the system and working a small dinner lift just to illustrate the machine in operation. On the dinner lift are marked different stops corresponding with the floors of actual passenger lifts, so that the working of the lift by push-button control can be demonstrated and explained. Builders and engineers will also be specially interested in the firm's electric riveting machine and universal suspended drilling machine, both of which will be shown in operation, structural iron pieces (angles and plates), as used in structural steel and crane bridge work, being drilled and riveted on the spot.

Hand-power lifts—dinner lifts, hall lifts, cabinet lifts, goods lifts—will form the chief exhibit of Messrs. Hammond & Champness at stand No. 122, row G. These are all fitted with self-sustaining gear which automatically locks the cage when the hauling wheel is released, holding it until the rope is again pulled. The lifts embody many special improvements and run easily. Iron staircases will also be shown at this stand, as well as a model of light steelwork for iron roofing.

ASPHALTS AND DAMP-COURSES.

The exhibit of Messrs. George M. Callender and Co., Ltd., at stand No. 71, row C, will be one of the most novel in the show, consisting of a lake laid out to illustrate the various methods of adapting "Callendrite" (pure Trinidad lake bitumen) sheeting for the lining of lakes, ornamental ponds, reservoirs, filter beds, swimming baths, &c., in order to render them absolutely watertight, whilst a bridge spanning the lake will show the method of rendering bridges and viaducts waterproof with the material. This firm is also exhibiting at stand No. 24, in the gallery, the "Rubite" sanitary pipe joint, non-rigid, and not liable to break owing to settlement in the ground.

Several varieties of roofing felt will be shown by Messrs. F. McNeill & Co. at stand No. 67, row C. There will be asphaltic felt for exterior roofing; non-odorous and bituminous felt for roof lining, sound-deadening, and for lining metal buildings; pure Trinidad bitumen sheeting for lining basements, cellars, swimming baths, etc.; McNeill's patent metal asphalt—a combination of sheet lead and bitumen for damp-coursing; slag wool for sound-deadening, insulating, and fire-proofing; and fibrous plaster.

Messrs. L. Lewis and Co. (stand No. 29, row A) will also have an exhibit of "mastic" asphalt, damp-coursing, roofing felt, and slating felt.

Messrs. Watson and Co., of Barnes, in addition to their well-known lead and bitumen damp-course and sheathing, will exhibit their new corrugated bitumen damp-course, which enables the mortar to dovetail, and prevents the possibility of walls travelling. Asphalt and bitumen will also be exhibited at this stand (No. 44, row A).

SANITARY APPLIANCES.

Messrs. Doulton & Co.'s large stand in the annexe will be of special interest by reason of its several exhibits. In the Sanitary section the principal features will be two bathrooms, the one with fittings of moderate price within the reach of the average householder, and the other illustrating what can be done in the way of luxury as well as comfort. The walls of each will be lined with tiles, with decorative treatments, one utilising non-reflective glazes and the other in the more usual "bright" enamels, and including a bold landscape frieze. The opposite end of the stand will be devoted to a group of various kinds of baths, all of cast-iron and white porcelain enamelled. Then there will be a general exhibit of sanitary fittings, including lavatories of numerous types, and water-closets, urinals, &c., of different patterns, each presenting special advantages in design and price, a special feature being made of Doulton's patent "Health Closet" with sloping top, which is claimed to be the only correctly designed closet from the medical point of view; while completing the sanitary exhibit will be white glazed sinks and the more common building materials, such as white glazed channels, drain pipes, gullies, &c., &c. A large section of the exhibit will comprise an installation of fireplaces and mantelpieces in glazed ware, and a new feature in this class of manufacture is the introduction of Doulton's "Carrara" stoneware, hitherto used more for external work. There will also be shown a small mantelpiece in coloured salt-glaze stoneware, and a group of Doulton ware and other art wares from the Lambeth studios. Other striking features on the stand will be the several samples of "Carrara" ware, a material which is being largely used for exterior façades in many of our principal towns, as it is capable of good architectural treatment, can be cleaned down, and resists the attacks of city atmospheres.

So numerous are the sanitary appliances to be shown at stand No. 86, row D, by the Sanitary Appliances Syndicate, that it is quite impossible to attempt any list of them here. Special attention, however, is directed to "The Only" silent closet, which is most carefully constructed in every part, and is made in a number of varieties, to suit different needs and finish. The other exhibits will comprise anti-flooding or tidal valves, and traps, inlet air valves, ranges of urinals, "The Only" automatic high-pressure flushing cistern, air-passage valves, &c., &c. Altogether a very comprehensive exhibit.

Messrs. Shanks & Co., Ltd., of Glasgow, are exhibiting examples of sanitary appliances, for which they have achieved a great reputation.

Another good sanitary exhibit will be that of Messrs. Davis, Bennett and Co., who will show at bay No. 14 modern bathrooms carried out in the most elaborate style, together with all kinds of lavatories and other sanitary apparatus.

Salt-glazed stone-ware pipes and connections of all kinds will be shown at stand No. 98, row E, by Messrs. H. and R. Mansfield, of Burton-on-Trent, a feature being made of the patent "self-centering" socket pipe, which assures true alignment, and can be laid by unskilled labour.

GRATES, STOVES AND RANGES.

The 18th-century-design grates which are supplied by the Carron Co. will be familiar to most visitors, if not by actual experience, at least by repute, for these grates have met with a very welcome appreciation from architects and others. The designs are from original carvings executed at Carron, Stirlingshire, more than a century ago—the work of William and Henry Haworth, students of the Royal Academy during the presidency of Sir Joshua Reynolds. They are of a reposeful character, with a restraint in their design, in striking contrast to the exuberance of the last century. Until recent years it was not easy for architects to obtain grates of a suitable design without having them specially executed. A great improvement in this direction has, however, since taken place, and as a consequence many manufacturers' catalogues show designs of excellent quality at reasonable prices. Among these must be included the grates of the Carron Co. The stand is bay 18.

The Nautilus Fire and Heating Co. (bay No. 8) will have a special exhibit of "Nautilus" grates, all the designs of which will be on show. These have been designed by well-known architects, and are of special interest. The firm will also exhibit some period mantelpieces and some very fine designs in Old English iron dog-grate interiors. There has latterly been quite a reversion to old types of design in firegrates, so that the exhibits at this stand will have a particular interest to architects and others connected with the design and furnishing of houses. Other exhibits, too, at this stand will be the firm's well-known ranges, which embody all the latest improvements, and are made with self-contained flues; they are adapted to take the "Mermaid" boiler. Two new types of baths will also be shown, one with a canopy and shower, and the other with the ordinary plunge. It will thus be seen that the exhibits at this stand are of quite an extensive nature, and they will no doubt receive the attention which they deserve.

Messrs. Candy & Co., Ltd., will show their "Devon" fire, one of sunken hearth type. This fire came out one of the three bracketted first in the official tests conducted by H.M. Commissioners of Works and the Coal Smoke Abatement Society at the New War Office. The examples of grates shown are artistic, while the construction of the fire is particularly worthy of note.

The "Well-Fire" is of the sunken hearth type. The manufacturers, the Well-Fire Co., Ltd., have paid particular attention to the provision of artistic designs and will display them in appropriate forms at a large stand. Their exhibit will be one of the most striking in the hall.

About a dozen suites of stoves and mantels will be shown by Messrs. Bratt, Colbran & Co. at stand No. 170, wall space.

A large number of armour-bright fireplaces of 18th-century design will be shown at stand No. 168, wall space, by Messrs. Smith & Wellstood, Ltd., who will also exhibit an entirely new range and one of their patent continuous-burning anthracite coal stoves.

Kitcheners of several kinds and boilers for hot-water services will be shown by Mr. Thomas Potterton at stand No. 55, row B.

Messrs. Hartley & Sugden, Ltd., are exhibiting their boilers for heating systems and all other details in connection therewith.

Geysers of several kinds, as well as radiators, water boilers, &c., will also be shown by Messrs. Fenlon & Son at stand No. 177, row K, annexe.

Messrs. Cakebread, Robey & Co. have a large stand (bay No. 17) on the ground floor, where they will exhibit high-class ranges, a kitchener with an ingenious arrangement for converting from a coal fire into a gas fire whenever desired (this being especially useful during the summer months), stoves, chimney-pieces, &c., as well as sanitary goods, builders' ironmongery, &c. ; a feature of the stand being a cast-iron verandah, painted white, with glass roof; while in "The Surveyor's" section of the exhibition, in the gallery, the firm will show their numerous patent drain joints and drain testing appliances, &c.

WINDOWS, WINDOW FITTINGS, &c.

For many years past inventors have been giving their attention to reversible windows, so as to enable the outside to be cleaned from within, and so avoid any of the risks which are run when windows are cleaned outside by persons standing on sills, &c.; most of the inventions, however, are unsatisfactory, either because they are too liable to get out of order or are too complicated and costly. But there have been some really satisfactory reversible windows, and among these is Martin's patent "Unique" sash, which has been used for numerous important buildings, such as St. Thomas's Hospital, where there are 700 of these sashes, while at "Bart's" there are no fewer than 800. The exhibit will be at the stand of Martin's Patents Co., Ltd., No. 223, row P, annexe.

One of the most attractive stalls will be No. 84, row D, where the Cloisonne Glass Co. will exhibit. A great number of windows in "landscape" design will be shown, these being especially suitable for vestibules; and there will also be some figure work, and ceiling lights; while a new process will be exhibited whereby the view through the window is preserved and yet the window cut up by a design all over. Other objects will be shown, too, which though not really pertaining to the building trade, are interesting as illustrating the adaptability of this material.

At stand No. 32, row A, Messrs. James Austin and Sons, Ltd., will exhibit numerous varieties of lines for sashes and blinds, including patent plaited sash lines, cotton sash lines for Colonial use, endless cords for fanlight openers, &c., &c.

The breaking of cords in sash windows is always a nuisance, but the trouble is very greatly minimised by the "Manchester" patent sash-cord holder, as this obviates the necessity of removing the beads and sashes when renewing the cords. Visitors can see this at the stand of Mr. Wm. H. Southern (No. 248, row S).

WALL AND CEILING COVERINGS.

The growing popularity of "Emdeca" for covering walls, ceilings, &c., will ensure much attention being given to the stand occupying special position No. 3. The material itself is attractive and pleasing in appearance, and the manner of its arrangement on the stand will enhance the effect. "Emdeca," as is well known, consists of flexible zinc sheets enamelled on one side and having the same appearance as tile work: it is, of course, much cheaper than the latter, and is easy to fix: with regard to the fixing, however, it should be understood that the "Emdeca" paste which is used is a thick oil paint, and provided reasonable care is taken to do the fixing properly no trouble will follow. The material is especially useful for lining bathrooms, lavatories, kitchens, shops, &c., and being obtainable in such a number of patterns, is most useful. At this stand will also be shown varieties of "Stelonite" stamped steel ceilings. These are made in England, and are executed in admirable designs. Such ceilings are common in the United States, but in this country they are, comparatively speaking, a novelty, and for that reason attention to them is now directed.

An attractive exhibit of glass tiles will be at the stand of the Hygienic Glass Tile Co., Ltd., No. 34, row A. With this class of tile there has been difficulty as regards secure fixing. The backing on the "Hygienic," however, is a special feature, being part of the tile and not affected by heat, damp or acid. It forms an excellent key. The colour is also on the back of the glass, and on this account the tiles have a brilliant effect.

At the stand of the Newellite Glass Tile Co. (No. 85, row D) a special feature will be a section of work as carried out on the Angel to Euston extension of the City and South London tube railway. On this extension the firm have laid about 12,000 super yards of "Newellite," and their tiles are also being extensively employed elsewhere, both at home and abroad.

At stand No. 68, row C, Messrs. Clark & Co. will exhibit "Xelite" Plaster, which material is intended as a substitute for Keene's or Parian cement. The makers claim that this plaster is a distinct improvement on the cheap, hard plasters, being the only one manufactured as a cement similar to Keene's, instead of being a retarded plaster. Large gaugings can be made at a time, it not being necessary to gauge up sufficient to be used in an hour. Further, with "Xelite" only one material is required for both rendering and finishing, it being mixed with sand for the former work, and used neat for the latter. The exterior of this stand is erected with Reconstructed Stone, of which the patentees are Messrs. W. G. Crotch & Son, of Norwich. It is specially suitable for exterior work. Another exhibit at this stand will be the English Glass Mosaic manufactured by Messrs. Crotch & Son.

Messrs. Machin & Koenig exhibit their "Compo-board," an excellent material for partitions, ceilings, and a substitute for plastering. The material is supplied in sheets and can be papered immediately it is nailed in position.

Messrs. John Line & Sons will show their wallpapers, a special feature being made of Georgian decorative motives. Their hand-painted friezes are also a pleasing treatment of wallpaper.

Messrs. A Sanderson & Sons will exhibit a choice selection from their large stock of wallpapers and also the Gilmour doors, for which they are the agents. These doors are made of small pieces of wood, veneered on the surface. The invention is applied to the construction of fire-resisting doors, and another excellent application is the construction of doors with flat surfaces that give no place for the collection of dust or microbes, for use in hospitals. Gilmour doors are superior to ordinary hardwood doors, while they are much cheaper.

SIGNS, &c.

Safety stair treads will be shown will be displayed at special position No. 5 by the Brilliant Sign Co., Ltd. This firm now make a speciality of selling Brilliant letters in the bulk to sole agents, and have also improved considerably on the output of their trade advertising tablets. Some time ago they introduced a new process for background work, which is fired on, and is absolutely permanent. This can be supplied without any extra charge, and all signs are guaranteed for fifteen years. The firm also claim to be unique in possessing a set of steel dies, which enables them to use stouter copper than their competitors having only wood dies. They have recently opened a factory in Antwerp, and, owing to the big demand of the original Brilliant letter, contemplate opening a similar factory in Buenos Aires, as their trade in the Argentine is rapidly advancing.

JOINERY AND TIMBER.

The exhibit of Messrs. Höfler is always an interesting one. There are to be no particularly new features in it this year, but the varieties of Austrian oak panelling and joinery, together with art metalwork, "Durato" flooring, &c., will make the stand (special position No. 17) an attractive one. The firm has already carried out such an extensive amount of Austrian oak panelling that their work will be familiar to the majority of visitors to the exhibition, and though this section will perhaps claim chief attention, the "Durato" flooring will be of much interest, as it has not long been introduced. It is a composition floor, which can be laid in any colour, and is not only jointless but fire-resisting and damp-proof.

Mr. John P. White, of Bedford, has so good a name as a maker of well-designed gates that those shown at his stand (No. 54 row B), are sure to be carefully examined. The exhibit will comprise working models of gates, together with photographs, &c., of various interior woodwork executed at the Pyghtle Works. An inspection of these will show the high class of the work, and the good taste in design which is characteristic of all Mr. White's productions.

Among the few firms of joinery manufacturers who have executed work for the leading architects is Messrs. Samuel Elliott & Son, Ltd. Many noteworthy examples of modern interior and external joinery have been entrusted to this firm and many of the examples of their work on exhibition are admirable pieces of craftsmanship and design.

It is often difficult to get sound, well-seasoned oak; therefore the exhibit of Castles' Ship Breaking Co., Ltd. (stand No. 80, row D), will be of interest to all who have need of such timber. Old ship timber of African and English oak beams will be exhibited. This is very suitable for building repairs and renewals for half-timbering, door frames, sills, and any other work for which seasoned timber is needed. Cheap hardwood timber for fencing and estate work will also be shown, as well as African oak treads and risers for staircases, and mahogany newels, &c.; and in addition there will be exhibited a garden shelter and teak garden seats, chairs and tables, and a sundial built from a ship's stanchion.

STAIR TREADS.

Safety stair treads will be shown at bay 16 A, in the gallery, by Messrs. Bishop's Safety Tread Co., Ltd. These are made of mineral rock asphalt, manufactured by the Limmer Asphalt Paving Co., Ltd., and are especially useful for repairing worn steps, being easily fixed, and durable. Among other places, these treads are in use at the Law Courts and the House of Commons.

The Month's Trade

Reports by our Special Correspondents.

CLAYWORKING INDUSTRY.

In the brick and tile trades little improvement is noticeable, although the building trade generally is gradually improving, and the outlook is hopeful. Employment has continued slack at Peterborough, at Nottingham, and in South Wales, while it has also been dull at Ipswich, Sudbury, and Chelmsford. In the Plymouth, Birmingham, and South Staffordshire districts it has been reported as fair. The centre of the gradual spreading improvement in the building trade is the Midlands, and the North where the engineering and cotton trades are prosperous. There is little doing in the South of England. Employment in the brick and tile trades in the Oldham and Stourbridge districts, and in South Wales and Monmouthshire, has continued good.

THE STONE, GRANITE, MARBLE, AND SLATE TRADES.

The stone trade is improving in sympathy with the other branches of the building trade. The improvement is not merely a seasonable one. It is evident that the anticipated revival of the building trade has arrived, and the prospects are most favourable.

As regards limestone quarries, employment has been fair in North Wales. In Stanhope, Westgate, Upper Weardale, and Derbyshire it has been fairly good, and about the same as a year ago; in the Plymouth district it has been fair. In the Somerset blue lias quarries employment has continued bad.

Sandstone quarrymen have been fairly well employed in North Wales. In the Gateshead district employment has been irregular, some quarries working half-time only. It has been fair in the Forest of Dean and in Aberdeenshire. In the Sheffield district employment has been slack on the whole. In the Rowsley district at building stone quarries employment has been fair. It has been dull in the pennant stone quarries near Bristol.

Chert quarrymen have been very busy in Derbyshire, some overtime being worked.

In Forfarshire employment in the quarries has been bad, and worse than a year ago.

With settmakers employment has been fair at Edinburgh, Aberdeen, and Glasgow, but not so good at Airdrie. It has been quiet in the Clee Hill district, and in Leicestershire and North Wales.

In the granite quarries employment on Dartmoor has been fair, and showed some improvement; at Penryn it has been bad. In Aberdeenshire it has continued bad.

Outdoor work in Aberdeen district is still of a very remittent nature, on account of the continued unsettled state of the weather—a few bright days being always followed by two or three days of weather prohibiting all outdoor work—hence, quarry work, building work, and contracts have been very much impeded. It is, therefore, not surprising that trade still continues very dull, and contracts which had been decided to be proceeded with have hung fire, and have not been put into the market. Navigation of the Baltic is now re-opening, the first cargo having arrived the other week, so that there need be no doubt about getting a plentiful supply of rough granite blocks for any work in contemplation.

A great scheme of new works, which has been drawn up by the Aberdeen Harbour Engineer, was submitted to the Harbour Board in committee some time ago. About 30 items of expenditure, totalling £556,380, were submitted for the Board's consideration, and the engineer pointed out that in his opinion the improvement works will have to be carried out during the 16 years ending September, 1923; in other words, the works will have to be gone on with immediately, or in the near future. Under the Aberdeen Harbour Act of 1895 the whole property of the harbour and works vested in the Commissioners for the purpose of this Act may revert at the date referred to to the Town Council, for behoof of the community of the city. Unfortunately for the granite trade, the material mostly used in the parts which will be proceeded with first will be timber, with simply a veneer of sett paving between the rails, and on the roadways.

Labour agents have been very busy amongst the hands employed in the granite industry throughout this district for some time past, and are offering great inducements to men connected with granite quarry work to go to Canada, where employment is guaranteed for three years on the Grand Trunk Railway, the consequence being that a considerable number of drillers, and even settmakers, besides a few labourers, have decided to go and try their luck there.

The Guernsey granite trade, on the whole, has not improved; orders do not increase as anticipated, and the business generally assumes a very dull aspect. The deliveries of cargoes have been seriously delayed in consequence of the weather conditions. Gales of wind and unsettled, stormy weather has retarded the movements of steam and sail, more especially the latter. Work in the quarries is not now handicapped by the bad state of the weather and low temperature, as it was a month ago. Shipments have been for a considerable period much below the average and there is no indication at the moment of a steady revival in the trade, which is much needed. In consequence of the continuation of slack trade generally, numbers of men are emigrating to Canada and United States.

The export of kerbs and setts from Norway to England has been rather slack lately, while there has been a good many enquiries from Germany. The dock and building stone trade is very slack at present.

As regards the slate quarries employment in North Wales has been moderate at Festiniog; it has been fair in the Carnarvon district. In Argyllshire there has been a slight improvement, but employment was again reported to be dull.

The returns for imports of stones, slabs and marble, rough, hewn and manufactured, for the month of February, 1907, as compared with the same month in 1905 and 1906, are as follows:—

Tons.			Value.		
1905.	1906.	1907.	1905.	1906.	1907
87,409	87,631	68,812	91,374	98,158	89,903

PORTLAND CEMENT TRADE.

There are unmistakable signs of activity in the Portland cement trade, and manufacturers generally are appreciably busier than they were in the earlier months of the year. The course of the market will depend largely upon the demand during the next month or two.

That the export business will continue extremely active there is no doubt whatever, so that, in a measure, the position will be governed by the home demand. Although manufacturers do not expect this to be in any sense abnormal they anticipate it will reach the average proportions of the best spring and summer months, and should this prove to be so, it is clear that the aggregate demands will be such as to tax to the utmost manufacturers' powers to supply.

There are already signs of a hardening of prices, and the position of the fuel market is such that substantially higher prices will have to be paid for cement to cover increased cost. The commitments ahead for foreign delivery are known to be large. Enormous quantities are being exported to the Pacific Coast of America; and Japan and the Far East are persistently in the market with large enquiries for shipments throughout the year. The position on the Continent is also satisfactory, with prices substantially higher than they were a short time ago. In the home market the building trades may be expected to show more activity after the holidays; while certain large contracts for harbour and water works in various parts of the kingdom are calling for increasingly large quantities of cement. It is true that some large Admiralty contracts which have taken huge quantities of cement have recently been completed, such as Keyham and Gibraltar, but to a large extent they have been succeeded by other contracts, such as Simons Bay and Singapore, which will require many thousands of tons before they are completed. It is stated that during the past ten years nearly 800,000 tons of British Portland cement have been used on naval works for our Admiralty. To some extent the trade has been affected by the reduction in expenditure of our great Government departments, but as against this must be set the growing demand for Portland cement in connection with the large development of ferro-concrete which is being shown in every direction. The erection of the new Post-office building on the Hennebique ferro-concrete system will be watched with great interest, and now that the Government has adopted this form of construction for so important a building we may reasonably expect to see other important bodies follow suit.

The most noticeable feature in the trade has been the great diminution of foreign imports, which are lower now than they have been for many years past.

The returns of imports and exports of cement for building and engineering purposes for February, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.

	1905.	1906.	1907.
Tons -	- 19,820	13.070	7,468
Value -	- £26,476	16,339	10,097

EXPORTS.

	1905.	1906.	1907.
Tons -	- 26,977	36,318	57,121
Value -	- £44,149	54,524	96,189

IRON AND STEEL TRADES.

The weakness in the pig-iron market still continues; indeed it has slightly increased during the past month, notwithstanding the fact that the public stocks continue to decrease very satisfactorily. The weakness is generally acclaimed as a purely speculative movement, but at the same time it affects the whole market because it holds back orders, and makers get nervous and drop prices. Prices are also dropping abroad and it looks as though makers cannot hold out against the movement altogether successfully. The makers have up to the present been fortunate enough to have plenty of orders in hand, so that they have been able to refuse to reduce prices materially up to now, and they hope to be able to maintain their position until prospective purchasers get tired of waiting for prices to drop. It would appear almost as though buyers could not hold back much longer, for prices now seem to be advancing slightly, but it is unlikely that they will quickly recover the level they reached a few months ago. The public stores still contain so much stock that they exercise a powerful influence, but the market is in an intrinsically strong position, for stocks are still being reduced and they are now about 282,000 tons less than this time last year. America has been taking a good deal of pig-iron, and the market is responsible to fluctuations in American demand. This has fallen off of late and bad reports have been about, but now it is stated that the prospects of further orders being given are better. Germany and other Continental countries are taking pig-iron, however, in good quantity. Even at the reduced prices makers cannot grumble, as fuel is now coming down in price.

The manufactured iron and steel market is naturally affected by the lowering of prices in pig-iron. Orders do not seem to be coming forward in anything like the quantity they ought, and it is thought that buyers are holding back in expectation of a fall in prices. Manufacturers have at present sufficient orders in hand to enable them to wait for a turn for the better, and until one or other are pressed nothing much can happen. Prices remain firm with little business doing. While home orders are slack there is an excellent demand from abroad.

In South Staffordshire there is little doing in pig-iron. A slight reduction in prices is expected when orders come forward. In finished iron a slight increase in business is reported. In Lancashire business is also quiet in regard to pig-iron and orders are not coming forward for finished iron and steel, but the makers are busy with orders in hand.

In the North-West of England market pig-iron is depressed, but in the finished iron and steel branch trade is better.

In the North of England there is a dearth of orders for pig-iron, but makers are standing out for better prices than what are realised for warrants. Large exports of pig-iron will take place to Germany for the next three months at least. Orders are also backward in manufactured iron and steel.

In Scotland pig-iron is in good demand, and the manufactured iron and steel market is better.

The American market seems to be somewhat unsettled and further developments must be awaited before anything can be said definitely. On the Continent Belgian prices have been reduced slightly for both pig-iron and manufactured iron and steel in the hope of encouraging orders, with the opposite result. The German demand, however, continues strong and is expected to influence the market favourably.

The return for imports and exports in certain branches of manufactured iron and steel for the month of February, 1907, as compared with the same month in 1905 and 1906, are as follows:

		Imports.			Exports.		
		1905.	1906.	1907.	1905.	1906.	1907.
Puddled Iron	tons	10,122	5,293	3,960	56,508	81,083	140,000
Wrought iron, in bars, angles, rods and sections		6,485	12,245	4,023	9,308	10,864	12,099
Rails		3,000	1,518	696	46,020	40,247	31,195
Steel:—Girders, beams, joists and pillars from Belgium		6,697	9,187	4,311	4,922	8,894	8,811
" " " " other countries		1,479	4,120	2,549			
Ingots, blooms, billets, slabs, sheet bars, tin plate bars, or similar partly manufactured		42,966	49,277	25,709	118	69	780
Bars, angles, rods and shapes or sections		3,256	5,872	661	9,308	10,864	12,099
Galvanized sheets (flat or corrugated)		—	—	—	30,207	37,183	39,263

THE PAINT TRADES.

The paint trades continue fair. As regards materials, the returns for imports and exports for February, 1907, as compared with the same month in 1905 and 1906, are as follows:—

		Imports. Quantity.			Value.		
		1905.	1906.	1907.	1905.	1906.	1907.
White lead	Cwts.	22,080	24,148	23,339	£17,881	21,433	23,355
Zinc oxide		13,835	17,372	18,774	14,532	19,031	21,349
Other colours and pigments		107,726	106,676	110,704	70,747	72,036	70,292
Turpentine		43,969	26,251	40,732	81,127	54,445	91,425
Lac-dye, seedlac, shellac and sticklac		6,528	5,697	5,761	48,657	50,544	57,028
Linseed oil	Tons	50	2,277	1,508	868	43,062	33,058
		Exports.					
White lead	Cwts.	23,130	27,771	33,928	22,332	29,675	40,818
Zinc oxide		4,049	6,945	8,129	5,116	8,822	10,191
Other colours and pigments		95,127	111,705	118,627	121,969	148,201	162,061
Linseed oil	Tons	2,220	1,697	1,797	39,890	38,652	44,454

OTHER METALS.

The great fluctuations that have occurred of late in the stock and share markets in the United States have had their effect on the price of copper, which has suffered a considerable drop.

The tin market has also been unfavourably affected by the same demoralisation on the American Stock Exchange.

Lead continues in much the same position as it was last month.

THE IRONMONGERY TRADES.

Employment in the lock and latch trades at Wolverhampton and Willenhall has continued bad. At Wolverhampton it has been good in all branches of the hollow-ware trade. It has been quiet with hollow-ware makers at West Bromwich, and bad with hollow-ware stampers and buffers at Sheffield.

In the stoves, grates, &c., trade, employment has been quiet at Rotherham, bad at Falkirk, and fair at Glasgow.

With nut and bolt makers employment has been good at Birmingham, Blackheath, and Winlaton. At Birmingham it has been good with wire and nail and shoe rivet makers. At Blackheath it has been good with wrought nail and rivet makers.

In the wire trade employment has continued good generally.

The returns for imports and exports for February, 1907, as compared with the same month in 1905 and 1906 are as follows:—

	Imports. Tons.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907.
Wire nails	2,617	3,716	2,898	£25,187	37,515	30,453
Nails (other than wire nails), screws and rivets	917	1,009	809	16,375	18,105	14,018
Bolts and nuts	358	382	224	5,625	6,325	3,735
	Exports.					
Nails, screws and rivets	2,134	2,496	2,305	36,303	43,326	45,779
Bolts and nuts	1,198	1,749	1,981	22,139	32,618	37,416

THE WALLPAPER TRADE.

The following is the return of paperhangings issued by the Board of Trade for February, 1907, as compared with the same month in 1905 and 1906:—

	Imports. 1905.	1906.	1907.
Cwts.	4,499	5,818	6,967
Value	£12,528	£16,198	17,685
	Exports. 1905.	1906.	1907.
Cwts.	8,305	8,242	10,281
Value	£22,802	22,173	28,403

The wallpaper trade is fair. It is interesting to note the reports on the values of imports and exports of wallpapers, particularly the former. While our exports are increasing and are considerably better than either last year or the year before, the imports of wallpapers have shown a still greater proportionate improvement. The actual figures are gives below. For the first two months of this year the

THE GLASS TRADE.

Employment has been quiet with glass bevellers at Birmingham, but it has continued good with sheet glass flatteners at St. Helens. With London glass blowers it has been fairly good. With pressed glass workers on the Wear and Tyne is has been moderate, and some short time has still been necessary.

The returns for imports and exports of glass for the month of February, 1907, as compared with the same month in 1905 and 1906, are as follows:—

	Imports. Cwts.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907
Window and German Sheet, including shades and cylinders	71,075	139,074	103,305	£45,273	79,692	56,362
Plate	34,649	35,333	32,063	42,415	44,829	41,626
	Exports.					
Plate	9,722	7,632	10,184	13,606	11,922	15,497

value of the imports of wallpapers have been 1·7 per cent. better than for the same period last year, and 33·5 per cent. better than for the same period in 1905. The exports, on the other hand, have only improved ·64 per cent. on last year, and 17·7 per cent. on 1905 for the same period.

Referring to the remarks made by two correspondents in our last "Contractors' Supplement" in regard to Wallpaper Manufacturers, Ltd., and certain non-trust houses, these were published by us in all good faith, but we are informed that several of the statements made are untrue, and we regret that they appeared in our columns.

Readers may be aware that in certain quarters a bitter attack on the wallpaper "combine" has latterly been made, and it would seem that there was a flavour of this in the remarks of the two correspondents in question.

Partnerships

[*The date when the partnership was dissolved is given in parenthesis where known.*]

Crickmay & Heath, architects, London (Nov. 6, 1906).

Haigh & Co., builders and contractors, Liverpool (Feb. 25).

Cumpsty & Seddon, builders, Hoylake (Feb. 4). Debts by I. Cumpsty.

Gent & Middleton, builders and contractors, Wellingborough (March 4).

Kay & Long, architects and surveyors, Leeds (May 20, 1906). Debts by J. P. Kay, who continues.

Mason & Cooper, builders and contractors, Nottingham (March 6). Debts by E. A. Cooper, who continues.

Bennett & Richardson, architects and surveyors, Finchley (Dec. 31). Debts by W. Bennett, who continues.

T. R. Bell & Co., builders and contractors, North Shields (Dec. 31). Debts by T. R. Bell, who continues.

White, Son & Pill, architects, surveyors, etc., Barnet (Feb. 28). Debts by A. T. White and A. E. Pill, who continue.

Lofthouse & Briggs, plumbers, painters and paperhangers, Clitheroe and Chatburn (March 16). Debts by H. Lofthouse.

T. E. Wright & E. Hurst, builders and contractors, East Dulwich and Petersfield (March 1). Debts by T. W. Wright.

John Shergold & Son, plumbers, painters, and house decorators, Cowes (March 12). Debts by J. W. Shergold, who continues at Albion Wharf.

C. & H. Gasson, building material merchants, brick and tile manufacturers, &c., East Grinstead (Dec. 31). Debts by C. E. Gasson, who continues.

New Companies.

Egyptian Lignolite and Brick Co., Alexandria. Capital: £50,000.

Ewen & Tomlinson, timber and builders' merchants, Priory Wharf, Hertford. Capital: £10,000.

H. Grover & Co., timber merchants, builders, etc., 752, High Road, Tottenham, N. Capital: £2,000.

Hooper & Ashby, Ltd., dealers in builders' materials, &c., Britannia Wharf, Southampton. Capital: £94,816

The Labour Market

Board of Trade Returns for February.

Employment in the building trades in February improved, in spite of bad weather, and is now better than a year ago. Returns from 895 firms, employing 52,592 workpeople, at the end of February, showed an increase in the number employed of 3.2 per cent., as compared with January. The table at the top of the next column summarises the returns received from employers.

From this table it will be seen that while there was a general increase in the number of skilled workmen employed, the increase in the case of labourers was smaller in proportion and less general.

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Workmen.	Labourers.	Lads and Boys.	Total.
London	9,465	6,157	592	16,214
Northern Counties and Yorkshire ...	3,036	2,692	706	6,434
Lancashire and Cheshire	4,591	3,356	1,245	9,192
Midlands and Eastern Counties...	3,058	2,975	450	6,483
S. & S.W. Counties and Wales	3,427	2,583	617	6,627
England & Wales ...	23,577	17,763	3,610	44,950
Scotland	3,322	1,889	926	6,137
Ireland	649	763	93	1,505
United Kingdom ...	27,548	20,415	4,629	52,592 ;

Employment was dull in most branches of the building trade, but moderate with plumbers. Bricklayers, plasterers, and slaters reported a slight improvement, and masons in Scotland reported a decline, compared with both January and a year ago. Compared with a year ago, carpenters and joiners reported an improvement, and plumbers a considerable improvement.

The percentage unemployed of Trade Union carpenters and joiners in the United Kingdom at the end of February was 7.9, as compared with 8.2 in February and 9.5 a year ago. The percentages unemployed of Trade Union plumbers for the same periods were 7.3, 6.7, and 12.1 respectively. The improvement in both branches compared with a year ago was general throughout the various districts.

London.

Employment continued dull generally. From Trade Union returns relating to carpenters and joiners in the London district it appears that 8.2 per cent. were unemployed at the end of the month, against 10.3 in January, and 9.1 a year ago. For plumbers the percentages were 13.0, 11.4, and 15.2 respectively. Painters reported employment as worse than a month ago; bricklayers as unchanged.

Northern Counties and Yorkshire.

Employment was dull generally, but moderate with plumbers.

Lancashire and Cheshire.

Employment was dull at Manchester and Liverpool, but moderate at Oldham.

Midland and Eastern Counties.

Employment was slack on the whole, but fair at Coventry and Shrewsbury, and improved at Walsall. At Nottingham it improved with carpenters, but declined with masons and plumbers, and was worse on the whole than a year ago. At Leicester it declined with bricklayers and carpenters, and improved with plumbers and painters.

Southern and South-Western Counties and Wales.

Employment continued dull generally.

Scotland.

Employment with plasterers was fair, and better than in January. With carpenters and joiners at Glasgow and Edinburgh it was moderate; with slaters at Glasgow and painters at Edinburgh it was fair; with bricklayers and masons it was slack generally. At Edinburgh employment was better on the whole than in January and a year ago. At Dundee it was worse than in January.

Ireland.

Employment was dull generally, but showed a slight improvement at Belfast and Cork.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen - -	8	—	8	8	8	8	8	4½–5
Accrington -	9	9	8½	9	7½	8½	—	5–5½
Ashton - under Lyne - -	9½	10	9	10	8¼	9	8½	5½–6½
Barnsley - -	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness - -	9	9	8¾	9	9	8¼	8¼	6–6½
Bath - -	7½	7½	7½	7½	7½	6½ 7½	6½	5–5½
Belfast - -	8½	8½	8½	8¾	8	8½	8½	19s.wk
Birkenhead -	9½–10	9½	9½	9½	9	—	8½	5–6½
Birmingham -	10–10¾	9½	9½	10	9	9½	8½	6½–7
Blackburn -	9½	10	9	9	9	9	8	5½–6½
Blackpool -	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton - -	9½	10	9½	10	9	9	8½	6–7
Bournemouth -	8	8	8	8	8	8	7½	5½
Bradord - -	9	9	8½	8½	9	9	8	6–6½
Brighton - -	9	8	8	8	8	9	7	5½
Bristol - -	9	9	9	9	9	9	8½	6
Burnley - -	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury - - -	9½	10	9½	9	9	9	8½	5–6½
Cambridge -	8½	8	8	8½	8	8½	6½	5–5½
Cardiff - -	9	9	9	9	9	9	8½	5½
Carlisle - -	8½	8½	8	8	9	8	8	5–5½
Chatham - -	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester - -	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie - -	9½	9½	9	9½	9	8½	9	6
Colchester -	8	8	8	9	8	9	6 6½	5–5½
Cork - - -	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3⅝
Coventry - -	9½	8¾	9	9	9	9	8	6
Crewe - -	8½	8	7	9	8	8	7	5–6
Darlington -	9	9	8½	9	9½	8	7½	6
Darwen - -	9½	9½	9	9	9	9	8¼	6
Derby - -	9	9	8½	9	9	8½	7½	5½–6
Dublin - -	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley - -	8½	8	8	8½	8	8	7	5½
Dundee - -	8½–9	10	9	8½	8½	9	8½	5¼–5½
Eastbourne -	8½	8	8	9	pce.	8	7½	5½
Edinburgh -	8½	9½	9	—	—	9	—	—
Exeter - -	8	8	7½	7½	7½	7½	6½	5
Glasgow - -	—	9½	10	9½	9	9	9	5½–6
Gloucester -	7½	8	8	7½	7½	8	7½	5
Greenock - -	9½	10	9	9½	9½	9	9	5½
Grimsby - -	—	9	8	9	pce	—	7½	6–7
Halifax - -	9	9	8¼	8½	8½	8½	7½	6
Hartlepools -	9½	9	9½	9½	—	—	—	6½–7½
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield -	9	9	8½	8½	9	7½ 8	7½	6
Hull - - -	9¼–9¾	9	9	9	9	9	8	6½–7
Ipswich - -	8	8	8	9	9	8	6½	5½
Keighley - -	8½	8½	8	7½	8½	7½	7½	6
Lancaster -	9½	10	8½	9	9	8½	8½	5½–6
Leeds - -	9½	9½	9	9½	9	9	8	6½–7
Leicester - -	9	9	9	10	9	9	8	6½–7
Leigh - -	9½	9½	9½	9	8½	9	8	6–6½
Lincoln - -	8½	8	8	9	8	8	7	5–6
Liverpool -	9½–10	9½	9½	9½	9½	9½	8½	5–6
London - -	10½	10½	10½	11	—	11	—	—
Londonderry -	7	7	7	7	6½	7	7½	15s.wk.
Macclesfield -	8	8	8	7¾	6½	7½	7½	5
Manchester -	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	9½	9	8	6¼–6¾
Newcastle -	9½	9	9½	9½	9½	9	8½	6¼
Newport(Mon.)	8½	8½	8½	8½	8½	8½	7½	5½
Northampton -	8½	8½	8½	8½	—	8½	7½ 8	5½
North Shields -	9½	9½	9½	9½	9½	9	9	6¼–6½
Norwich - -	9	9	8½	9	9	8½	7½	5–6
Nottingham -	9½	9	9	10	9	9	8½	6½
Oldham - -	9½	10	9½	9	8½	9	8½	5½–7
Oxford - -	8½	8	8	8	8	9	7	5½
Paisley - -	9	9½	9	9½	9	9½	9	6
Perth - -	8	10	8	8	8	8	7½	5½–6
Plymouth -	8	8	8	8	8	8	7	5
Portsmouth -	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston - -	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale - -	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham -	9½	9½	8½	8½	8	8½	7½	6
St. Helens -	9	9	9	9	9	8½	8¼	5½–6
Scarborough -	8½	8½	8	8½	30s. wk.	8	7½	6
Sheffield - -	9½	9½	9	9	9	9	7½	5½–6½
Southampton -	7½	8	8	8	pce	8	7	5
Southport -	9	9	8¾	9	9	9	8½	6
South Shields -	9½	9½	9½	9	9½	8¾	8½	6¼
Stockport -	9½	9½	9	10	9	9	—	6–7
Stockton - on - Tees - -	9	9½	9¼	9½	9½	9	8	6¼–6½
Sunderland -	9½	9½	9¼	9½	9½	37s. wk.	9	6¼
Swansea - -	8½	—	8½	8½	—	8½	7½	5½
Torquay - -	7	7	7½	7	7	7	7	4½–5
Wakefield -	9	8½	8	8½	8	7½	7½	6
Walsall - -	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington -	8¾	9¼	9¼	9½	8½	9¼	—	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan - -	9½	10	9	9	8½	9	8½	5½–7
Wlverhampton	9	9	9	8½	8½	9	7½	6–6½
Worcester -	8½	8½	8½	8½	8½	8½	7	5½
Yarmouth -	7½	7½	7½	A	7½	7½	6	4½

A. Done by bricklayer.

THE BUILDERS' JOURNAL
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May 1, 1907.

CONTRACTORS' SUPPLEMENT (MONTHLY).

Vol. XXV. No. 638. **6, Great New Street, Fetter Lane, London, E.C.**

MANCHESTER INFIRMARY.

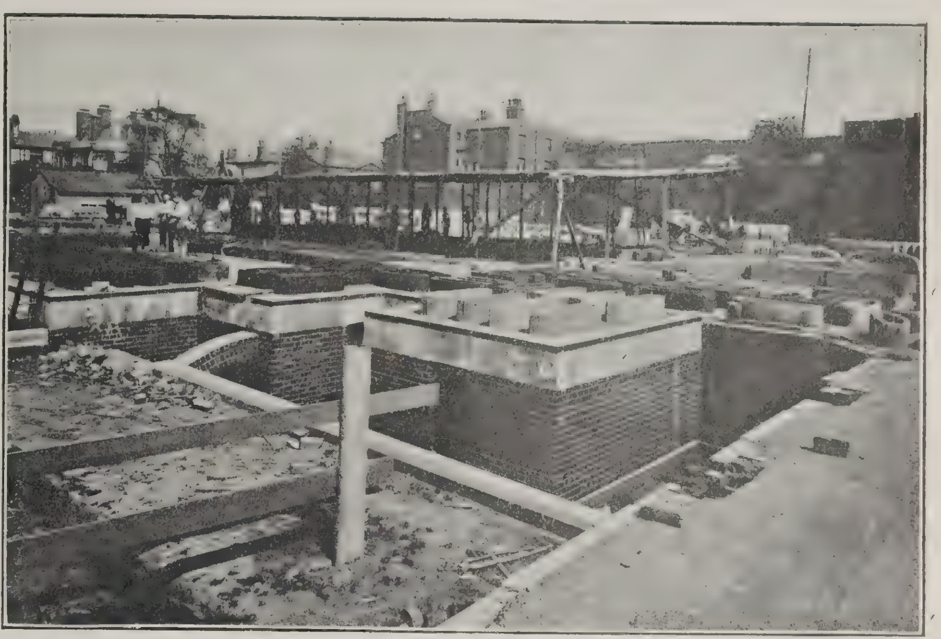

FIG. 6. MAKING CONCRETE FLOOR TUBES.

We publish several views of the Manchester Royal Infirmary, in course of construction. The erection of this building has been a smart piece of work. The contract for the superstructure was given to the builders—Messrs. Harold Arnold and Son, of Doncaster—in August, 1906, and the entire work is expected to be completed this coming summer. The magnitude of the job will be realised when we mention that the area of floors is 40,000 square yards. The site covers 12 acres. The rapid construction has been greatly due to the assistance of the National Fireproofing Co., of 27, Chancery Lane, London, who have the contract for the floors. Fig. 1 shows the state of the job at the end of June, when the foundations had been completed, before the commencement of the superstructure. These foundations are of concrete, of the ordinary type, while between the footings the whole surface has been covered over. Fig. 2 shows the state of the job a month later, and it will be seen what considerable progress had been made in that time. Fig. 3 shows a portion of the site on March 6th last—namely, eight months later. It will be seen that the shell of several of the blocks is already completed. The construction of the buildings generally is in red brick, with stone dressings.

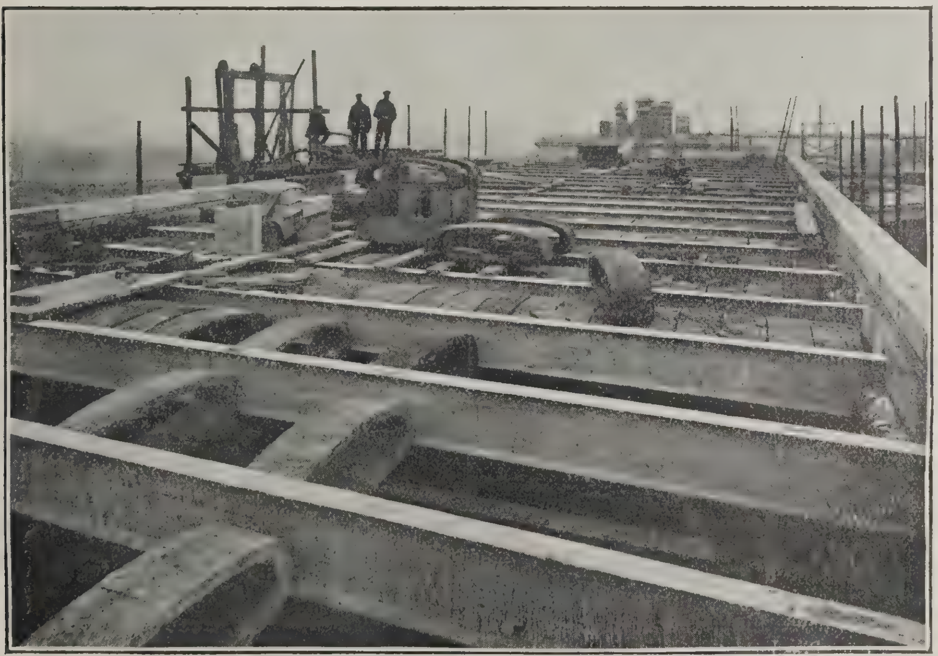

FIG. 5. CONCRETE TUBES IN POSITION.

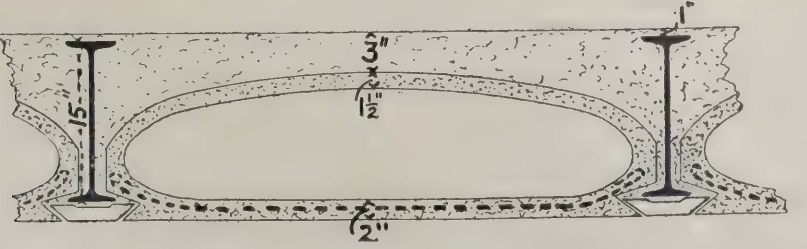

FIG. 4. DETAILS OF TUBE FLOOR CONSTRUCTION.

The construction of the fire-resisting floors is particularly interesting, and we refer to these in detail, as they are novel, and the job is a very large one. The larger part of the 40,000 yards of floors has been constructed with hollow concrete tubes, 4-ft. 6-in. span, between, and resting on, steel joists. The construction is illustrated in the diagram, Fig. 4, and also in the photographic view, Fig. 5. Upon the concrete tubes a filling of concrete is placed to bring the surface of the floor level with the joists. The total thickness of the floors varies, according to the span from 8ins. to 16ins. The tubes are made open or flat, according to the depth of joist. The form of the tubes is clearly shown in Figs. 4 and 5, and it will be seen that the bottom crust is 2ins. thick, while the top is generally 1½ins. thick. The bottom crust of the tube is reinforced with two $\frac{3}{16}$-in. diameter rods. The filling of concrete on the tubes varies from 2ins. upwards, according to the depth of floor. The bottom flange of the steel joist is protected by a tera-cotta soffit tile, resting on the lip of the tube, as shown in Fig. 4. Fig. 5 shows the tubes being put into position before the concrete is filled in on top.

It is obvious that no centering is required, and such a type of construction is cheap, speedy in erection, and particularly serviceable where deep joists are used and a level ceiling is required. Its advantages over the ordinary solid concrete floor are that it is sound-proof, whereas

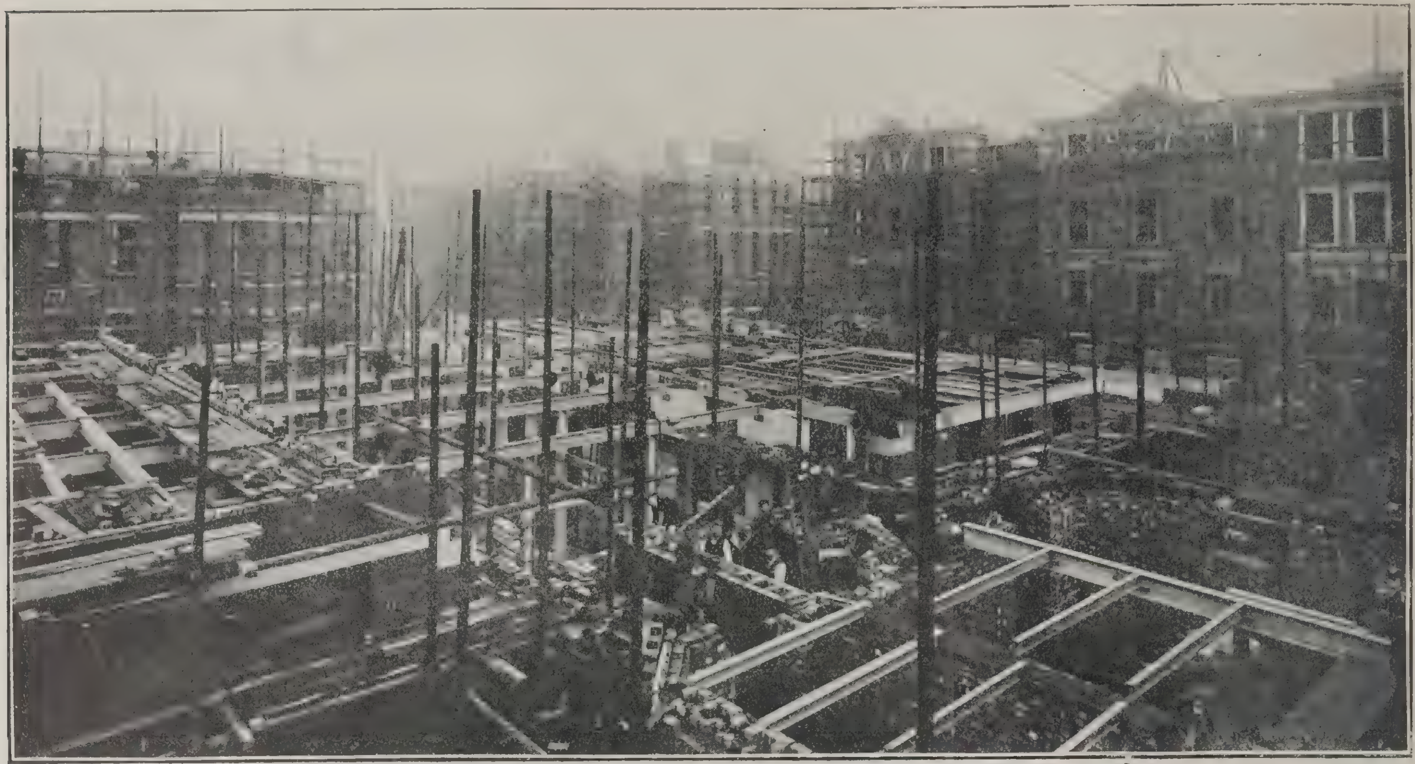

FIG. 3. MANCHESTER ROYAL INFIRMARY: CONDITION OF WORKS ON MARCH 6th, 1907.

the solid floor conducts sound readily. The tube floor is about one-third the weight of a solid floor.

The tubes are manufactured on the site, Fig. 6 showing the factory where the tubes were moulded, the tubes being seen in the foreground laid out for drying, and the men at work tamping the concrete into the moulds in the background. This view, however, does not represent the place where the majority of the tubes were made, these being moulded in the cellar below the building shown in this particular view.

The moulds used for casting the concrete tubes are made of heavy steel, and have been patented. The tubes are removed from the moulds after twenty minutes. The proportions of the concrete used in their manufacture has been 1 part best Portland cement to 4 parts of pan breeze, well mixed and thoroughly rammed. The proportions of the concrete used for the filling, it may be here remarked, were 5 of pan breeze to 1 of Portland cement.

A second system of floor construction was adopted for the corridors. In this case tubes were also used, but they did not rest upon steel joists. The tubes were placed lengthways with the corridor, upon strips of centering, with tee-bar reinforcements placed across the corridors, so as to virtually form reinforced concrete beams. This construction is shown in Fig. 7, where the reinforcement will be seen to consist of two tees. The span in such cases does not exceed 10ft. The concrete tubes of the corridor portion are of 3-ft. 6-in. span, the webs at the top and bottom being 2-ins. As before mentioned, the tubes were sustained by centering and the concrete was filled in so as to form the reinforced beams *in situ,* making a monolith construction.

A third system of floor construction has also been adopted by the National Fireproofing Co. for the circular operating theatre and some of the odd-shaped buildings. This consists of a double-construction solid concrete floor, with round rod reinforcement.

Our photographs are by Mr. J. Ambler, of 5, Market Street, Manchester, who has taken photographs periodically of the work in progress.

GERMAN MASONS AND BRICKLAYERS.

The Central Federation of Trade Unions of Masons and Bricklayers of Germany has published a report summarising the results of an investigation of the rates of wages and hours of labour of skilled workmen in this trade in 1905. The total number of adult workpeople to whom the statistics of rates of wages relate is 218,660, out of a total of 223,803 covered by the returns received. Of these, 1,532 or 0.7 per cent., were paid at a rate less than 3d. per hour, while at the other extremity of the scale there were 27,254, or 12.5 per cent. of the total, whose rate of pay was over 7½d. per hour. The rates of pay of the remaining 189,874—the large majority—fell between these limits—viz., 3d. and 7½d. inclusive. The largest number of workpeople paid at one rate was 17,144, who received 6d. per hour, but nearly as many (16,370) were paid 4¾d. For the whole Empire the average rate in 1905 was 5½d., as compared with 5d. in 1900. This increase is a continuation of the upward movement shown by similar averages since 1885, when the rate was 4d.

The average rate varied for the different provinces of the Empire. Excluding certain special classes of men, such as the *Putzer*, in Berlin, who combine the operations of bricklaying and plastering, and are paid 1s. per hour, it is stated that the highest wages in 1905 were paid in Schleswig-Holstein, Hamburg, and Lübeck, where the average was 7½d. per hour, and the lowest in the province of Silesia, where it was only 4¼d. It appears that close on three-fourths of the workpeople had a normal working day of ten hours.

"THE BUILDER'S MANUAL."

With this title Messrs. Young and Marten, Ltd., of Caledonian Works, Stratford, E., have issued a new illustrated catalogue. This presents a very useful and comprehensive collection, and the firm were wise in giving, on the inside of the front cover, a summary of the contents, which makes reference to the multitudinous goods easy, while a detailed index can be consulted for any particular article. Messrs. Young and Marten cover a very wide field, and their catalogue includes almost everything necessary for the construction and equipment of the modern house. First we find illustrations of drain-pipes, gulleys, &c., then chimney pots, cement, timber, doors, mouldings, window-glass, cisterns, baths, ranges, mantles and firegrates, decorators' tools, locks, gas fittings, &c., &c. The selection in each case is an extensive one, and, as everything is illustrated, as well as priced, the catalogue is a most serviceable one. Some coloured plates of stained glass, tile pavements, slab tile panels, baths, &c., are included, and an important section is devoted to fire suites, comprising mantles, firegrates, curbs, &c. All architects and builders should obtain this catalogue, and keep it for reference.

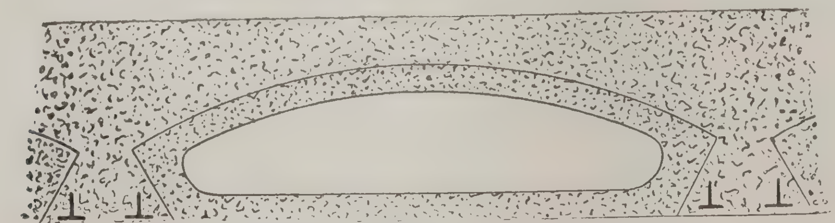

FIG. 7. REINFORCED CONCRETE FLOOR WITH TUBES.

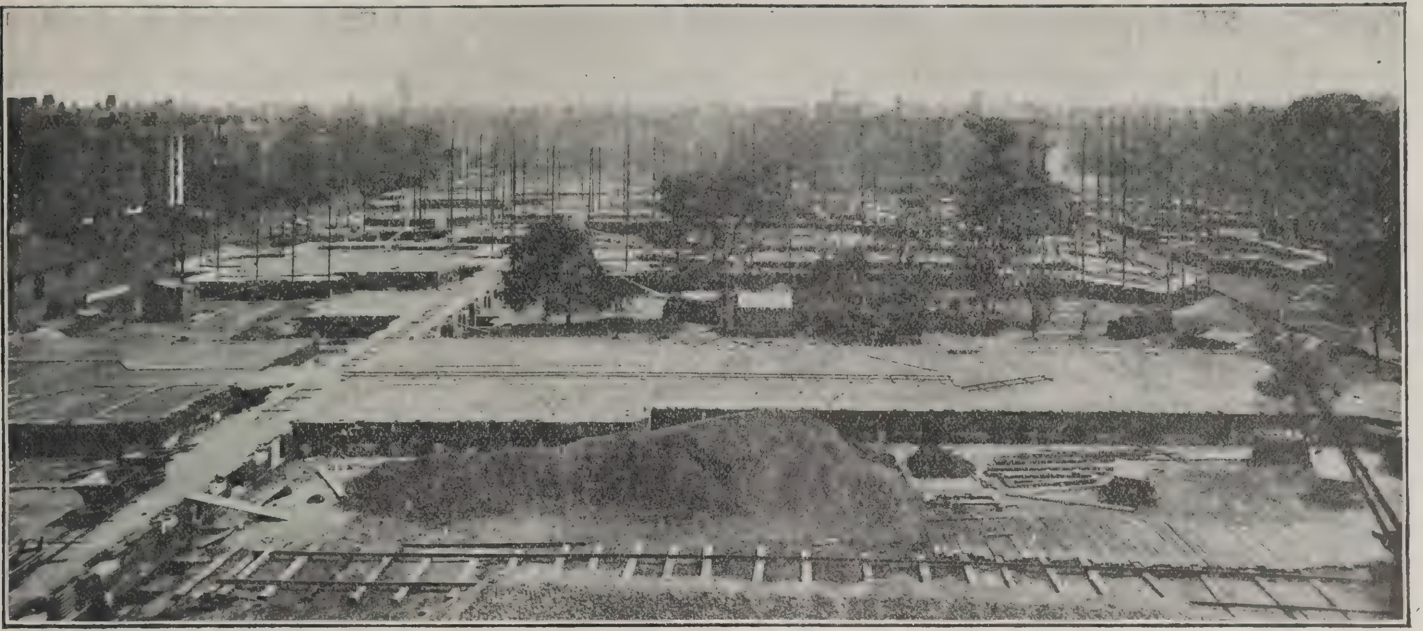

FIG. 1.—MANCHESTER ROYAL INFIRMARY: CONDITION OF WORKS ON JUNE 30TH, 1906.

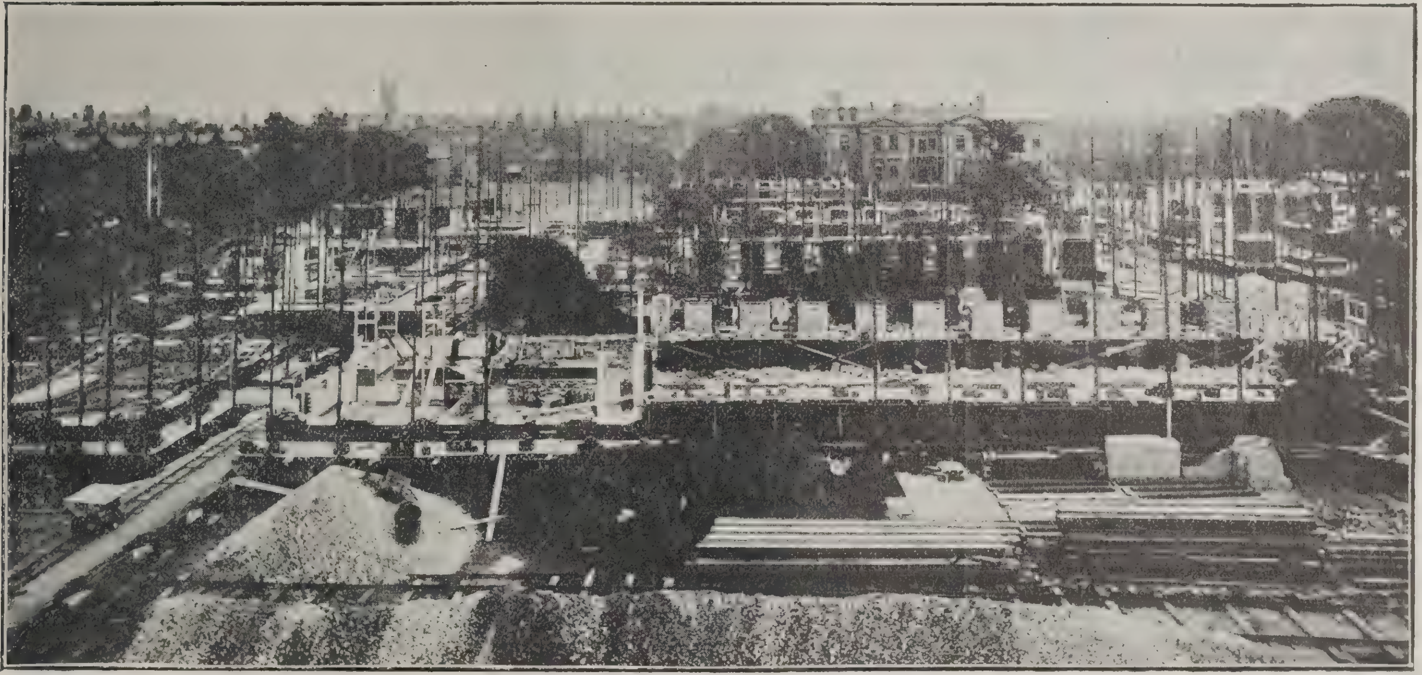

FIG. 2.—MANCHESTER ROYAL INFIRMARY: CONDITION OF WORKS ON JULY 30TH, 1906.

Builders' Notes.

The Building Trade in Canada.—This year the cost of building materials in Canada is expected to be higher. Timber—including lumber, laths, shingles, and floorings—has advanced in cost of late by from 5 to 15 per cent. In British Columbia the scarcity and high prices of logs, and in the other provinces the general lowness of stocks at the mills, coupled with the great demand, are held responsible for the recent advances. The price of plumbing supplies is also rising. Detailed information has recently been collected by the Department of Labour with reference to building operations during 1906 in 41 cities of the Dominion, an estimate of the total value of the buildings erected being obtained in each case. The total value of buildings erected in these cities was $58,140,294. Of this total the City of Toronto, Ontario, the locality in which building was most active, contributed $16,160,398. The City of Winnipeg, Manitoba, came second, with a total of $12,760,450; Montreal, Quebec, third, with $8,600,300; and Vancouver, B.C., fourth, with $4,233,910. The remaining cities in which the value of building during 1906 exceeded $500,000 were: Port Arthur, Ontario, $2,894,760; Hamilton, Ontario, $2,124,815; Edmonton, Alberta, $1,869,069; Ottawa, $1,728,975; Calgary, Alberta, $1,482,984; London, Ontario, $1,200,000; Fort William, Ontario, $1,152,240; Moosejaw, Saskatchewan, $843,221; Brandon, Manitoba, $748,672; Victoria, B.C., $699,300; Halifax, N.S., $688,315; Peterborough, Ontario, $615,000; and Belleville, Ontario, $600,000. The prospects seem good, therefore, for emigrating architects and assistants.

A Difficult Alteration.—An extraordinary feat of structural alteration was recently carried out at the Alhambra, London. After the evening performance on Saturday, April 13th, and before the audience assembled on the Monday evening, the contractors moved the entire grand circle, dropping it 11ins. in front and giving it a tilt of 8ins. at the back. The workmen toiled incessantly through night and day, and only put the finishing touch to their task at 7.10 on the Monday night, the audiences being in their places at 7.45.

A Conciliation Board at Norwich has been established. Mr. John Hurn (master carpenter) has been appointed chairman, Mr. George Brown (of the Bricklayers' Society) vice-chairman, Mr. J. H. Hatch employers' secretary, and G. E. Beckwith operatives' secretary. As a result, a code of working rules has been settled upon.

The Month's Trade

(Reports by our Special Correspondents.)

THE CLAYWORKING INDUSTRY.

The outlook in the brick trade is very promising. Makers have been called upon to submit a large number of quotations recently, and it appears that competition is growing much keener among contractors, with the result that prices are rising. Stocks, too, are much lower at the works than they have been for several years past. This may be due to the fact that several big undertakings have been pushed on during the winter; but it is also certain that there has been increased demand of late.

The Kent and Essex Brickmasters' Association having been disbanded, the Fletton brickmakers are strengthening their association, and steps are being taken to prevent under-cutting at prices which only result in a loss. The Fletton brickmaking industry is very active. Large quantities of bricks are being despatched.

In the Midlands trade is extremely brisk. The prices are rising. From the inquiries which are being received it appears that a continued improvement may be expected, and that there may even be a boom before long.

As regards the blue brick trade, a new association has recently been formed of brickmakers—namely, the West Bromwich, Oldbury and District Brickmasters' Association—which has determined upon stopping the suicidal policy of selling bricks below cost price. The makers have entered into a legal contract not to sell below certain prices, and each firm has deposited a sum of money, which would be forfeited if it transgressed by underselling. An advance of 1s. per 1,000 was made on February 1st, and a further advance of 1s. on March 1st; and it is intended to increase prices further until a fair profit upon capital invested is secured. The South Staffordshire Blue Brickmasters' Association, which embraces makers in South Staffordshire, East Worcestershire, and Warwickshire, is also carrying on similar work. It advanced prices on January 1st and again on March 1st, while it has secured a large works capable of producing 150,000 blue bricks weekly, so as to prevent its being started again, and so checking other production. It is also proposed to stop other works by taking up the leases in a similar way. There are a number of large contracts in prospect for blue bricks, and we shall no doubt see a considerable rise in the near future.

The Board of Trade reports that employment has continued slack at Peterborough and at Nottingham, where short time has been general, while it has also been dull at Exeter, Ipswich, and Chelmsford. At Oldham, and in the Tees and Hartlepool district, a decline was shown. At Birmingham it was moderate. Employment in South Staffordshire and Shropshire was fair, and was better than a month ago. It continued good in the Stourbridge district. In North Wales it was fair at Mold, and slack at Ruabon and Wrexham.

The brickmakers of Birmingham have at last decided that the present price of bricks cannot remain as it is. For some time the Black Country Association has raised its price something like 2s. 6d. or 3s. a thousand, and the Birmingham Brickmasters' Association has now decided upon advancing the price 2s. per thousand. The reasons, of course, are that the price of slack has gone up something like 2s. 6d. to 3s. a ton. As something like a ton of slack is requisite to the baking of a thousand bricks, the increase in the latter is made accordingly. In Birmingham and district something like a million and a half of bricks are made per week. The arrangement arrived at for the increase in bricks is only a tentative one. A further meeting has been convened for a few weeks hence, when the question will be debated as to whether a still further increase in price will be necessary.

The English brickmakers—and, indeed, builders — will sympathise with the troubles of the Colonial brickmasters, who are unable to compete for even the small trade there is in South Africa on account of the railway rates and the terminal charges. The siding and terminal charges amount to 2s. 1d. per ton, or 8s. 4d. per thousand bricks, in addition to the 6s. 3d. for carriage, making a total of 14s. 7d. per thousand bricks for delivery into Cape Town from brickworks within 12 and 23 miles. These rates make it impossible for these works to deliver bricks at such a price as will enable them to compete with works in the town. Some owners of private sidings do not pay for haulage and shunting. The Capetown Chamber of Commerce has investigated the matter, and resolved upon sending a deputation to the Commissioner of Public Works, to urge that all charges for haulage and shunting of traffic on private sidings be abolished.

THE STONE, GRANITE, MARBLE, AND SLATE TRADES.

The stone trade is slowly but steadily improving, in sympathy with the building trade generally. During the past month the quarries have been better employed than in the previous month or a year ago. The reports, too, from the building trade show that masons have been fairly well employed. Trade is better in the Midlands than it is in the South of England, or, indeed, in Scotland. For this the causes are obvious, and have already been dealt with in these columns before. As regards detailed reports from the various centres, these will be found below.

In the limestone quarries employment has been good in Weardale. It has continued fair in Cumberland, Cleveland, Derbyshire, the Plymouth district, and North Wales. In the Somerset blue lias quarries employment has continued bad.

In the Bath stone quarries employment has been slack.

Employment has continued fair with sandstone quarrymen in North Wales, and has been moderate and better on the whole than a month ago in the Sheffield district. Employment has been better in the Gateshead district. It has been moderate in quarries in the Rowsley district, and has shown an improvement on a month ago. It has been dull in the Gloucestershire pennant stone quarries, and bad and worse than a month ago at Portland. Employment has continued bad in Forfarshire.

In the Clee Hill road-material quarries and the chert quarries in Derbyshire employment has been good.

In the granite quarries employment has been fair in Aberdeenshire. In Leicestershire it has been generally slack, though slightly improved. Employment has been dull on Dartmoor and bad in the Penryn district.

In the Aberdeen district the quarries have been able to work more regularly during the past month, despite the rather cold weather. One very well-known quarry—Persley—was sold out, on account of the rock not being got in sufficient quantities to make the carrying on of the quarry profitable. The paving trade is still very quiet, and a contract in the northern suburbs which was expected to come out has been deferred indefinitely, which is disappointing to quarryworkers. The relaying of the Bayview section of the tramways has been sanctioned, but, as very few new setts are required for this work, the quarries will not benefit to any extent. The building trade in the meantime shows no signs of improvement, and the polishing trade also remains dull. It is to be hoped that, with better weather, business will begin to look up again.

A new steam-driven compound air compressor has just been built for Messrs. A. & F. Manuelle at the engineering works of Mr. Alexander Wilson, Aberdeen. It is specially designed for rock-drilling. The air is compressed in two stages. First it is drawn through an automatic inlet valve into the low-pressure air cylinder and compressed up to 25lbs. per cubic inch. From this cylinder it passes through to an inter-cooler, and is there thoroughly cooled. The air is then drawn into the high-pressure cylinder and compressed up to 100lbs. final pressure. The machine is fitted with an automatic unloading valve on the low-pressure air cylinder, which automatically cuts off the load of compression when the full capacity of the machine is not being used, and also slows down the engine when no air is being compressed. The capacity of the machine is 800 cub. ft. of free air per minute, and the engine develops 100 horse power.

Employment with settmakers has been good at Glasgow and fair at Airdrie, being better than a month ago at both centres. Employment has continued fair in Aberdeenshire. It has been fair on the whole in North Wales. At Stoney Stanton (Leicestershire) and in the Clee Hill district employment has been dull.

In the slate quarries employment has been slack in the Festiniog district in North Wales. There has been a further slight improvement in Argyllshire, where employment is reported as fair.

In the House of Commons recently Mr. Ellis Davies asked the Secretary of State for the Home Department whether his attention had been called to the fact that, according to the Report on Mines and Quarries for 1905, the fatalities among the inside workers in mines were 1.519 per 1,000, whilst among inside workers in slate quarries it was no less than 2.39; and what steps, if any, had been taken in face of the statement on Mines and Quarries (1905), page 95, that an unsatisfactory feature of table 82 was the high death-rate among the inside workers in slate quarries. Mr. Gladstone, in reply, said :—" I am aware of the figures to which the hon. member calls my attention, and which are those published in the annual statistics issued by my Department. The figures, however, for 1906, not yet issued, will show a very great decrease in the death rate for the Carnarvonshire slate quarries, only one fatal accident having occurred at those quarries during the year. The conditions existing at these quarries are receiving special attention from the inspectors, and I have called for a further report from them on the subject."

Mr. Ellis Davies later also asked the Secretary of State for the Home Department whether any supervision was exercised by the Home Office with regard to the qualifications and appointments of quarry managers; and, if not, whether, in view of the fact that the percentage of fatalities among inside workers in slate quarries in 1905 was nearly double that in coal mines, and that there had been six lives lost in Carnarvonshire already this year, he would appoint a committee of inquiry, with a view to the amendment of the Quarries Act.

Mr. Gladstone, in reply, said: "There are no statutory requirements at present as to the appointment or qualifications of quarry managers. This is a point which has already been noted for consideration when I can find an opportunity for amending the Quarries Act. Having regard to the complication of the existing legislation on the subject, I have decided to consult the chairman of the Royal Commission on Mines with a view of advising His Majesty to include the consideration of accidents in quarries in the reference to the Commission.

The returns for imports of stones, slabs and marble, rough, hewn and manufactured, for the month of March, 1907, as compared with the same month in 1905 and 1906, are as follows:—

Tons.			Value.		
1905.	1906.	1907.	1905.	1906.	1907
106,849	93,289	90,720	125,932	112,608	105,247

THE PORTLAND CEMENT TRADE.

Since our last report manufacturers have advanced their prices both for the home and foreign markets. Prices are now substantially above those ruling a year ago; but, with the exception of one or two individual concerns, where somewhat different conditions apply, it is doubtful whether the manufacturer is much, if any, better off, in view of the higher cost of fuel and other materials. Be this, however, as it may, there is no doubt that the extraordinary demand for Portland cement which obtains in practically all foreign markets, and which has taxed the majority of manufacturers both in this country and on the Continent to the utmost, fully justifies the present range of prices. These at home, it should be noted, are substantially lower than those now current on the Continent for the artificial product, and a further advance may be anticipated should the existing market conditions continue as favourable as they now undoubtedly are. It is true that the building trades at home, excepting in one or two districts, are far from flourishing, thus affording a striking contrast, to our disadvantage, to the state of things existing on the Continent, in the United States, and elsewhere. But the contracting trades are getting busier, while the export demand is as persistent as ever, and shows no sign of falling off. Japan has come to Europe for hundreds of thousands of casks, while it is no exaggeration to say that several millions of casks have been booked for the North and South Pacific ports of America during the past few months. An interesting item of news is to be found in the fact that the Panama Canal Commission, notwithstanding the recent resolution of the United States Senate that home manufacturers should be favoured as against the foreigner, is again inquiring in this market for supplies. It is notorious that enormous quantities of cement will be required for this gigantic work, and it now seems clear that the United States manufacturers will be unable to supply anything like the whole of it. Other works abroad which will absorb huge quantities of cement in the near future are the extensions of the Antwerp docks and fortifications, the widening of the Kiel Canal, and the heightening of the Nile Dam at Assouan. Buyers need only to examine the Board of Trade statistics relating to Portland cement to realise the position of the market in this product. Every month now for some time past the exports from this country have shown very substantial increases over a year ago; while the imports, to take only the first three months of this year, are but little more than 50 per cent. of what they were for the corresponding period of 1906.

The returns of imports and exports of cement for building and engineering purposes for March, 1907, as compared with the same month in 1905 and 1906, are as follows:—

Imports.

	1905.	1906.	1907.
Tons -	- 25,161	13,333	8,040
Value -	- £31,713	17,157	11,071

Exports.

	1905.	1906.	1907.
Tons -	- 35,867	46,545	62,276
Value -	£56,502	70,930	98,208

The Anglo-Austrian Bank, in conjunction with an English syndicate, propose to establish a company, to be styled the Anglo-Austrian Cement Company, with the object of making cement from the slag resulting from steel manufacture in Austria. The combination will work their own patents, and arrangements are being made with Austrian ironworks for the purchase of the slag.

The following statement, issued by the United States Geological Survey, and published in the "Iron Age" (New York), shows the approximate production of hydraulic cement in the United States for the calendar year 1906. The statement is said to be exact within a small fraction of 1 per cent., and is issued in advance of the annual report on the production of cement which is now being prepared in the Department named. The returns on which it is based are complete with the exception of those from four small plants:—

The total production of all kinds of hydraulic cement in 1906, including Portland, natural rock, and Puzzolan cement, was 50,027,321 barrels, valued at $54,015,713. Of this total 45,610,822 barrels were Portland cement, with a value of $51,240,652; 3,935,275 barrels were natural rock cement, with a value of $2,362,140; and 481,224 barrels were Puzzolan cement, valued at $412,921.

The total production of cement in 1905 was 40,894,308 barrels, valued at $36,012,189.

A report on commercial conditions in the Philippines in 1906, published by the United States Department of Commerce and Labour, states that the cement-making industry offers an inviting field for enterprise in the Philippines. There is a well-defined formation of limestone (the greater part of which is suitable for cement) underlying all the principal islands of the archipelago. This limestone has been thoroughly investigated, with a view to ascertaining its cement-making qualities, at Binangonan (Laguna de Bay), and to a certain extent in the island of Romblon. At both places a very excellent quality of material was found, and fortunately the beds are well situated with regard to transportation facilities. It is believed that still more favourable locations may be found, or possibly a better stone be discovered, if a careful search is made.

A Customs notice, dated February 7th, 1907, states that compressed slabs of fibro-cement—which can be used as substitutes for wrought stone—shall, on importation into the Australian Commonwealth, be charged with duty leviable on wrought stone, n.e.i. (viz., 20 per cent. *ad. valorem.*)

IRON AND STEEL TRADES.

The pig-iron trade seems to be rapidly recovering from the recent depression, which was due to speculative influences. The present position is very satisfactory. Prices have risen considerably, and the stocks in the public stores have been reduced in the month by about 55,000 tons. This is in part due to continued demands from abroad, but is chiefly attributable to the increased home demand. Buyers have been holding back in the uncertain and speculative condition of the market in the hopes of prices falling still further, and now that the intrinsically strong position has at last been victorious over speculative influence, the chary ones are anxious to get in before the price rises much. An exceptionally brisk business has been done in April, and the demand has exceeded the production, so that the public stores have been much reduced. Stocks are indeed getting down to a more manageable quantity, and the prospects were never more favourable. The reports from the United States and the Continent continue satisfactory, and it is hoped that there will be no clouds in the sky for some time to come.

In regard to manufactured iron and steel, there has been more activity during the past month, and the demand is rapidly improving. Prices are firm, and there seems no prospect of a downward movement, especially as the price of fuel and pig-iron is going up. The export trade is going strong, and the home trade seems to be waking up.

In the North of England the past month has shown a record demand and production in pig-iron. The deliveries have been exceptionally heavy, and stocks were largely drawn upon. Everything tends in favour of sellers. The demands from Germany are unprecedented, and the American demand continues. Last month over 40,000 tons of iron had to be taken out of Connal's public stores. The demand for manufactured iron and steel shows signs of improvement.

In South Staffordshire the local demand for pig-iron is increasing. Prices continue strong. As for manufactured iron and steel, the demand and the prices are improving.

In the north-west of England the demand for pig-iron is very brisk, and the manufactured steel trade is more active.

In Lancashire the pig-iron market is stronger, but the manufactured branch is unchanged.

In Scotland the pig-iron demand is brisk. Manufactured iron and steel is chiefly in request for export, but makers have a fair amount of orders in hand and the future is hopeful.

In the foreign market Germany is taking great quantities of iron from us, while America continues her buying in the

English market. The prospects in both countries are good. In Belgium, though the market is satisfactory at the moment it is not happy for the future, prospects being unsettled.

The return for imports and exports in certain branches of manufactured iron and steel for the month of March, 1907, as compared with the same month in 1905 and 1906 are as follows :—

		Imports.			Exports.		
		1905.	1906.	1907.	1905.	1906.	1907
Puddled Iron	tons	11,483	5,879	3,563	80,135	114,159	167,726
Wrought iron, in bars, angles, rods and sections		8,063	10,929	3,646	11,960	11,487	13.797
Rails		5,978	696	1,747	45,305	25,326	40,139
Steel :—Girders, beams, joists and pillars from Belgium		8,047	8,305	3,948	5,078	9,568	8,610
,, ,, ,, ,, other countries		2,373	4,453	3,122			
Ingots, blooms, billets, slabs, sheet bars, tin plate bars, or similar partly manu actured		58.397	48,663	22,644	457	417	1,758
Bars, angles, rods and shapes or sections		3,722	5,178	1,107	13,454	15,702	19,931
Galvanized sheets (flat or c rrugated)		—	—	—	36.518	32,790	47,229

According to the "Australian Mining Standard," a company has been formed in Melbourne, with a capital of £500,000, to erect large works for manufacturing iron and steel in the Commonwealth. The site of operations is near Irondale, on the Mudgee line, New South Wales. In a summary on the iron-ore deposits of New South Wales, by C. S. Wilkinson, F.G.S., the following reference is made to the Wallerawang deposit, which the above company propose to work :—

"There are three localities favourably situated for the establishment of smelting works—near Mittagong or Picton, in the south-western coalfield on the great Southern Railway line; near Wallerawang, or Lithgow, on the edge of the western coalfield on the Great Western Railway; and near Rylstone, also in the western coalfield, on the Wallerawang-Mudgee Railway line. The ore in the latter localities might, if required, be worked together, and smelted at some central works near Wallerawang or other convenient site. The quality of iron-ore available for smelting works in the Mittagong or Picton district is estimated approximately at 8,234,000 tons, containing 3,684,000 tons of metallic iron; in the Wallerawang district, 2,484,000 tons of ore, yielding 1,212,000 tons of metallic iron; and in the Rylstone district 2,226,000 tons of ore, containing 957,180 tons of metallic iron; or a total quantity of 12,944,000 tons of ore, containing 5,853,180 tons of metallic iron."

OTHER METALS.

The Copper Market continues to improve. The demand is as strong as ever, and the outlook for a long time to come is very bright. The shortage in supply places the market beyond bad influences from speculation to a great extent.

Tin also continues in strong demand, and prices are at a high level. The stock in the world's markets has been considerably reduced recently, and the position therefore is intrinsically strong, if speculative influences are active.

Lead has increased in value during the past month.

THE IRONMONGERY TRADES.

Employment in the lock and latch trades at Wolverhampton and Willenhall has continued bad. At Wolverhampton it has been good in all branches of the hollow-ware trade. It has been quiet with hollow-ware makers at West Bromwich, slack with hollow-ware stampers and buffers at Sheffield.

In the stoves, grates, &c., trades employment has been good at Newcastle, quiet at Rotherham and Glasgow, quiet at Falkirk, with short time.

With nut and bolt makers employment has been fairly good, and good with wire nail and shoe rivet makers at Birmingham. At Blackheath it has been good with bolt, rivet, &c., makers. At Winlaton it has been good with nut and bolt makers.

Employment with wire workers has continued good generally.

The returns for imports and exports for March, 1907, as compared with the same month in 1905 and 1906 are as follows :—

	Tons.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907.
Imports.						
Wire nails	3,522	3,779	3.437	£34,610	37,749	35,949
Nails (other than wire nails), screws and rivets	1,308	1,075	639	24,671	17,831	12,538
Bolts and nuts	494	586	286	8,224	9,171	5,177
Exports.						
Nails, screws and rivets	2,172	3,023	2,685	41,615	51,776	49,159
Bolts and nuts	1,781	2,190	2,115	29,737	38,291	40,060

THE GLASS TRADE.

Employment has been fair with plate-glass bevellers at Birmingham, and better than a month ago. It has continued good with sheet-glass flatteners at St. Helens. Employment has been good with glass-blowers in London. With pressed-glass makers on the Tyne and Wear employment has been moderate, short time having to be worked.

The returns for imports and exports of glass for the month of March, 1907, as compared with the same month in 1905 and 1906, are as follows :—

	Cwts.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907
Imports.						
Window and German Sheet, including shades and cylinders	90,486	107,286	105,174	£54,480	58,480	59.708
Plate	43,619	27,045	39,567	54,212	35,976	49.982
Exports.						
Plate	8,454	12,412	9,831	12,221	19,480	17,443

THE PAINT TRADES.

The paint trades continue fair. As regards materials, the returns for imports and exports for March, 1907, as compared with the same month in 1905 and 1906, are as follows :—

		Quantity.			Value.		
		1905.	1906.	1907.	1905.	1906.	1907.
Imports.							
White lead	Cwts.	27,850	27,950	24,697	£22,654	25,051	24,807
Zinc oxide		18,545	27,651	28,163	18,724	27,393	32,669
Other colours and pigments		131,745	128,958	140,337	80,112	75,124	84,443
Turpentine		9,395	64,975	35,342	9,362	137,741	80,628
Lac-dye, seedlac, shellac and sticklac		6,743	7,286	9,686	47,431	68,786	95,232
Linseed oil	Tons	144	2,092	1,816	2,652	41,289	39,605
Exports.							
White lead	Cwts.	29,938	36,502	35,745	29,713	38,176	42,588
Zinc oxide		4,883	6,572	8,885	5,645	8,358	10,903
Other colours and pigments		119,904	119,671	123,579	156,857	162,334	164,393
Linseed oil	Tons	3,101	1,877	2,024	54,350	44,666	49,647

THE WALLPAPER TRADE.

The following is the return of paperhangings issued by the Board of Trade for March, 1907, as compared with the same month in 1905 and 1906 :—

	1905.	1906.	1907.
Imports.			
Cwts.	4,338	6,519	7,382
Value	£11,778	18,120	18,232
Exports.			
Cwts.	9,423	8,812	8,643
Value	£24,122	22,981	22,792

New London Buildings

At yesterday's meeting of the London County Council the Building Acts Committee reported the following applications under the London Building Act, 1894, their recommendations as to consent or refusal being appended in *italics* :—

Building on the western side of Dartmouth Road, Lewisham, abutting also upon the southern side of London Road, on the application of J. Tolley, on behalf of the London and South-Western Bank (*Consent.*)

Buildings on the western side of Gloucester-Road, Kensington, to abut also upon the northern side of St. George's Place, in connection with the application of P. Hoffmann, on behalf of J. C. Hill. (*Consent.*)

Buildings on the western side of Fulham Road, Kensington, and abutting upon South Street, Alfred Place, North Terrace, and Brompton Road, in connection with the application of W. G. Hunt on behalf of Lady George Campbell. (Consent.)

One-storey shop in front of No. 158, Uxbridge Road, Shepherd's Bush, on the application of W. C. Jordan. (*Consent.*)

Projecting porches in front of Nos. 1 to 63 (odd numbers only) inclusive, Danecroft Road, Norwood, on the application of W. C. Goddard. (*Consent.*)

Projecting iron and glass shelter in front of the University Hotel, Endsleigh Gardens, St. Pancras, in connection with the application of Collcutt & Hamp. (*Consent.*)

Two shelters at No. 10, St. James' Street, one to abut upon King Street and the other upon St. James Street, on the application of Jones & Willis, Ltd. (*Refusal.*)

Addition to the Royal Agricultural Hall on the site of Swanley Street, Islington, on the application of J. Jeffrey, on behalf of the Royal Agricultural Hall Company, Ltd. (*Consent.*)

Warehouse building on the north-eastern side of Leman Street, Whitechapel, on the application of F. E. L. Harris, on behalf of the Co-operative Wholesale Society, Ltd. (*Refusal.*)

Formation or laying out of two new streets for carriage traffic in continuation of Headworth Road and Burtop Road, Wandsworth, on the application of H. G. Hills on behalf of the Wandsworth Metropolitan Borough Council. (*Consent.*)

Five dwelling-houses on low-lying land situated at Lynton Road, Bermondsey, on the application of T. Sloman. (*Consent.*)

Liverpool Cathedral : Progress of the Work.—Good progress is being made with the erection of the Lady Chapel of Liverpool Cathedral, the arcading on the south side having been completed, and work on this portion carried up to a height of about 15ft., while the north side is being proceeded with, and a commencement has been made with the vestries. The superstructure of the main fabric has also been commenced, the portion in hand being the arcade and north and south walls of the choir. Messrs. Morrison and Sons, of Wavertree, are the contractors.

New Companies

BOULTON & CO. (LONGPORT), brick and tile manufacturers, Port Vale, Wolstanton. Capital: £20,000.

FOSTER & DICKSEE, LTD., contractors, builders, &c., 84, James Street, Rugby, and Manresa Road, Chelsea, S.W. Capital: £80,000.

METROPOLITAN CEMENT CO., to acquire any patents for France or elsewhere, and to carry on the business of manufacturers and workers of and dealers in cement, lime, plaster, &c. Capital: £120,000.

Bankruptcies.

DURING THE WEEK ending April 26th twenty-two failures in the building and timber trades in England and Wales were gazetted.

FISHER BROTHERS, Reading. R.O., April 16.

T. WALSH, joiner and builder, Darwen. R.O., April 19.

A. H. VASS, brickmaker, Leicester. R.O., April 15.

W. COX, builder and wheelwright, Salisbury. R.O., April 18.

W. HEATHCOTE, contractor, Worsley. Liabilities, £1,899; assets estimated at £1,006.

R. H. MARTIN, builder, Plymouth. P.E., Town Hall, East Stonehouse, May 17, at 12.

HERBERT & CO., builders, Acton. P.E., Vestry Hall, Brentford, May 21, at 11. R.O., April 16.

W. SQUIRES, architect, Pannal. Liabilities, £1,375; assets estimated at £2,909; surplus, £1,534.

H. BAXTER, builder and contractor, Mansfield. £1,140 expected to rank for dividend; deficiency, £694.

E. W. CRICKMAY, architect and surveyor, Croydon and London. Gross liabilities, £781; assets, £6; deficiency, £705.

T. GILL, builder and bricklayer. First meeting, C.C., Madeley, May 15, at 1. R.O., April 15.

J. WOOTTON, timber merchant, Wisbech St. Peter. First meeting, C.C., King's Lynn, May 9, at 10.30. R.O., April 15.

H. METCALF & T. GREIG, architects and surveyors, Sergeant's Inn, E.C. Liabilities, £468,647; £96,225 expected to rank; assets *nil*.

G. H. JONES, builder, Handsworth. First meeting, 191, Corporation Street, Birmingham, May 1, at 11.30. P.E., Birmingham C.C., June 3, at 2.30.

R. HAYDON TEBB, architect and surveyor and buyer and seller of land and property, London Gross liabilities, £156,715 (£65,114 unsecured); assets, £77,671.

C. D. COLLINS, builder and undertaker, Earlsfield. First meeting, 132, York Road, London, S.E., May 2, at 11.30. P.E., Wandsworth C.C., May 9, at 12. R.O., April 16.

E. WHITE, brick manufacturer, Colder Common. First meeting, 15, Jewry Street, Winchester, May 1, at 3. P.E., The Castle, Winchester, May 13, at 11. R.O., April 18.

The Labour Market

Board of Trade Returns for March.

Employment in the building trades in March, though still dull, showed a seasonal improvement, and was better than a year ago.

Returns from 818 firms, employing 51,719 workpeople at the end of March, showed an increase in the number employed of 7.5 per cent. as compared with February, the improvement affecting all districts and both skilled workmen and labourers.

The table in the next column summarises the returns.

Employment was dull with bricklayers, masons, and carpenters, and also with plasterers—except in Scotland, where plasterers were fairly busy, owing to the pressure of term work. With plumbers, painters, and slaters employment was moderate, and in Scotland slaters were reported as busy. Employment was generally better than in February and a year ago; but with plumbers it showed a slight decline compared with February, while masons in Scotland reported it as worse than in February, and much worse than a year ago.

The percentage unemployed of trade-union carpenters and joiners in the United Kingdom at the end of March was 5.6, as compared with 7.9 in February, and 7.4 a year ago, the improvement being general throughout all districts. The percentages unemployed of trade-union plumbers for the same periods were 7.8, 7.3, and 11.1 respectively, the improvement, compared with a year ago, being general.

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Workmen.	Labourers.	Lads and Boys.	Total.
London	9,765	7,132	642	17,539
Northern Counties and Yorkshire ...	3,239	2,792	719	6,750
Lancashire and Cheshire	4,080	3,069	1,048	8,197
Midlands and Eastern Counties...	2,884	2,327	397	5,608
S. & S.W. Counties and Wales	3,169	2,123	564	5,856
England & Wales ...	23,137	17,443	3,370	43,950
Scotland	3,507	1,936	933	6,376
Ireland	599	705	89	1,393
United Kingdom ...	27,243	20,084	4,392	51,719

London.

Employment continued dull generally, but was better than in February and a year ago. From Trade-Union Returns relating to carpenters and joiners in the London district, it appeared that 5.5 per cent. were unemployed at the end of the month, against 8.2 in February and 7.8 a year ago. For plumbers the percentages were 12.8, 13.0, and 16.3 respectively. Bricklayers reported employment as unchanged compared with February, 1907, and March, 1906.

Northern Counties and Yorkshire.

Employment was dull generally, but better than in February. It was good with painters at Hull and Newcastle, and with plumbers at Jarrow and Wallsend, and fair with masons at Sheffield.

Lancashire and Cheshire.

Employment was better than in February. At Manchester it was fair with painters and moderate with bricklayers, but bad with plumbers. At Oldham, Blackburn, and Burnley it was moderate. At Bolton it was slack.

Midland and Eastern Counties.

Employment was dull on the whole, but better than in February. At Coventry it was fairly good. Employment was moderate with bricklayers in the Potteries, and with plumbers at Birmingham. With painters at Birmingham and Leicester it was fair.

Southern, South-Western Counties and Wales

Employment was better than in February. It was good with bricklayers at Plymouth, and with painters at Plymouth and Cardiff. With masons at Plymouth and Cardiff it was moderate. With carpenters and joiners it was slack generally.

Scotland.

Employment was dull with bricklayers and masons. With painters it was good, with plasterers fair. With carpenters and joiners it was fair at Glasgow and Edinburgh, and slack at Dundee. With masons employment was worse than in February, with other branches it was better.

Ireland.

Employment was dull on the whole, but fair with plumbers and good with painters at Dublin; fair with masons and plasterers at Belfast, and with masons at Cork.

SOME RECENT ARBITRATIONS.

The Coventry and District Builders' Association and the Coventry United Trades Committee of Carpenters and Joiners having applied to the Board of Trade for the appointment of an arbitrator to settle a dispute, Mr. A. A. Hudson, barrister-at-law, was appointed. The employers had given notice for an alteration in the rule relating to walking-time, while the workpeople had given a counter notice for (1) an advance in wages of ½d. per hour, (2) an alteration in the overtime rule, and (3) an alteration in the rule respecting the settlement of disputes by a Conciliation Board. Mr. Hudson, in his award, decided that the walking-time radius should be extended to 1½ miles from the centre of the town, but he excluded from its operation all men who were set on at the job. He further decided against the workpeople in respect of the claims raised by them.

Mr. Hudson also acted as arbitrator in the dispute between the master builders and the plumbers and painters. The employers had given notice of an alteration in the rule relating to walking-time; the workpeople had given a counter notice for an alteration in all the working rules, and had put in a claim for an advance in wages of ½d. per hour (8d. to 8½d. for painters, and 9d. to 9½d. for plumbers). The arbitrator drew up a new set of working rules, which were to come into operation on April 1st, 1907. The principal features of the award are an alteration in the rules for overtime; the fixing of the same radius (1½ miles) for walking-time as he had previously fixed for the carpenters; and the insertion of a new rule fixing the hours of labour. On the question of wages, the arbitrator decided that no change should be made.

Mr. Hudson further acted in the dispute between the Coventry master builders and builders' labourers. The workpeople had given notice for an advance in wages from 6d. to 6½d. per hour, and for an exact definition of the walking-time boundaries. With regard to the walking-time question, the employers had given a counter notice. Mr. Hudson decided that the walking-time rule fixed by him for carpenters, plumbers, and painters should also apply to labourers. No change in the rate of wages was awarded, except that ½d. per hour extra is to be paid for repairs to bakers' ovens, brick sewers, and boiler flues.

Mr. A. A. Hudson was the arbitrator appointed in the dispute with painters at Wakefield. The main question in dispute was a claim of the workpeople for an advance in wages from 7½d. to 8d. per hour, but there was also a difference as to the renewal of the working rules. The arbitrator decided that no change should be made in the rate of wages, and that the working rules should be renewed and remain in force without alteration until February 1st, 1909.

Mr. Hudson was also the arbitrator appointed in the dispute with painters at Manchester. The questions in dispute covered several working rules; but the main dispute arose out of the rule relating to walking-time, and out of a claim by the workpeople for an advance in wages of 1d. per hour. The arbitrator modified the rule as to walking-time somewhat in favour of the employers, and awarded an advance of ¼d. per hour (8¾ to 9d.) to the workpeople.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen	8	—	8	8	8	8	8	4½–5
Accrington	9	9	8½	9	7½	8½	—	5½–6
Ashton-under-Lyne	9½	10	9	10	8½	9	8½	5½–6½
Barnsley	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness	9	9	8¾	9	9	8¼	8¼	6–6½
Bath	7½	7½	7½	7½	7½	6½–7½	6½	5–5½
Belfast	8½	8½	8½	8½	8	8½	8½	19s. wk
Birkenhead	9½–10	9½	9½	9½	9	9½	8½	5½–6½
Birmingham	10	9½	9½	10	9	9½	8½	6½–7
Blackburn	9½	10	9	9	9	9	8	6
Blackpool	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton	9½	10	9½	10	9	9	8½	6½–7
Bournemouth	8	8	8	8	8	8	7½	5½
Bradford	9	9	8½	8½	9	9	8	6–6½
Brighton	9	8	8	8	8	9	7	5½
Bristol	9	9	9	9	9	9	8½	6
Burnley	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury	9½	10	9½	9	9	9	8½	5–6½
Cambridge	8½	8	8	8½	8	8½	6½	5–5½
Cardiff	9	9	9	9	9	9	8½	5½
Carlisle	8½	8½	8	8	9	8	8	5–5½
Chatham	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie	9½	9½	9	9½	9	8½	9	6
Colchester	8	8	8	9	8	9	6 6½	5–5½
Cork	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3⅝
Coventry	9	8¾	9	9	9	9	8	6
Crewe	8½	8	7	9	8	8	7	5–6
Darlington	9	9	8½	9–9½	9½	8	7½	6
Darwen	9½	9½	9	9	9	9	8¼	6
Derby	9	9	8½	9	9	8½	7½	5½–6
Dublin	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley	8½	8	8	8½	8	8	7	5–5½
Dundee	8½–9	10	9	8½	8½	9½	8½	5¼–5½
Eastbourne	8½	8	8	9	pce.	8	7½	5½
Edinburgh	8½	9½	9	9	—	9	—	5½
Exeter	8	8	7½	7½	7½	7½	6½	5
Glasgow	—	9½	10	9½	9	9	9	5½–6
Gloucester	7½	8	8	7½	7½	8	7½	5
Greenock	9½	10	9	9½	9½	9	9	5½
Grimsby	—	9	8	9	pce	—	7½	6–7
Halifax	9	9	8¼	8½	8½	8	7½	6
Hartlepools	9½	9½	9¼	9½	—	—	—	6½–7
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield	9	9	8½	8½	9	7½ 8	7½–8	6
Hull	9¾	9	9	8	9	9	9	6½–8
Ipswich	8	8	8	9	9	8	6½	5–5½
Keighley	8½	8½	8	7½	8½	7½	7½	6
Lancaster	9½	10	8½	9	9	8	8½	5½–6
Leeds	9½	9½	9	9½	9	9	8	6½–7
Leicester	9	9	9	10	9	9	8	6½–7
Leigh	9½	9½	9½	9	8½	9	8	6–6½
Lincoln	8½	8	8	9	8	8	7	5–6
Liverpool	9½–10	9½	9½	9½	9½	9½	8½	5–6
London	10½	10½	10½	11	—	11	—	—
Londonderry	7	7	7	7	6½	7	7½	15s. wk.
Macclesfield	8	8	8	7¾	6½	7½	7½	5
Manchester	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	8½	9	8	6¼–6¾
Newcastle	9½	9½	9½	9½	9½	9	8½	6¼
Newport (Mon.)	8½	8½	8½	8½	8½	8½	7½	5½
Northampton	8½	8½	8½	8½	—	8½	7½–8	5½
North Shields	9½	9½	9½	9½	9½	9	9	6¼–6½
Norwich	8	8	8	8	8	8	6½	5
Nottingham	9½	9	9	10	9	9	8½	6½
Oldham	9½	10	9½	9	8½	9	8½	5½–7
Oxford	8½–9	8	8	8	8	9	7	5½
Paisley	9	9½	9	9½	9	9½	9	6
Perth	8	10	8	8	8	8	7½	5½
Plymouth	8	8	8	8	8	8	7	5
Portsmouth	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham	9½	9½	8½	8½	8	8½	7½	6
St. Helens	9	9	9	9	9	8½	8¼	5½–6
Scarborough	8½	8½	8	8½	33s. wk.	8	7½	6
Sheffield	9½	9½	9	9	9	9	7½	5½–6½
Southampton	8	8	8	8	pce.	8	7	5
Southport	9	9	8¾	9	9	9	8½	6
South Shields	9½	9½	9½	9	9½	8¾–	8½	6¼
Stockport	9½	9½	9	10	9	9	8	6–7
Stockton-on-Tees	9	9½	8	8½	—	9	8	6¼–6½
Sunderland	9½	9½	9¼	9½	9½	37s. wk.	8½	6¼
Swansea	8½	—	8½	8½	—	8½	7½	5½
Torquay	7	7	7½	7	7	7	7	4½–5
Wakefield	9	8½	8	8½	8	7½	7½	6
Walsall	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington	8¾	9¼	9¼	9½	8½	9¼	8	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan	9½	10	9	9	8½	9	8½	5½–6½
Wlverhampton	9	9	9	8½	8	9	7½	6
Worcester	8½9¼	8½	8½	8½	8½	8½	7	5½
Yarmouth	7½	7½	7½	A	7½	7½	6	4–4

A. Done by bricklayer.

Current Market Prices.

MISCELLANEOUS.

		£	s.	d.	£	s.	d.
Bricks Stocks, d/d to job	per 1,000	1	17	0		—	
Do. Flettons on rail ...	do.	1	7	0		—	
Do. Pressed Wire Cuts, d/d to job ...	do.	2	0	0		—	
Do. Blue brindled wire cuts	do.	1	5	0		—	
Do. do. wire cuts ...	do.	1	9	0		—	
Do. do. pressed facings	do.	2	0	0		—	
Coke Breeze, into carts at gasworks ...	per load	0	2	0		—	
Do. d/d to job	do.	0	4	0		—	
Sand	per yard	0	7	6		—	
Ballast	do.	0	6	6		—	
Cement	per ton	1	13	0		—	
Lime	do.	1	4	0			
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds	per sq. ft.	0	0	3		—	
Do. do. do. do. 3rds.	do.	0	0	2		—	
Do. do. do. 21oz., 2nds.	do.	0	0	5		—	
Do. do. do. do. 3rds	do.	0	0	3		—	
Do. do. do. 26oz., 2nds	do.	0	0	6		—	
Do. do. do. do. 3rds	do.	0	0	4¼		—	
Do. do. do. 32oz., 2nds	do.	0	0	8		—	
Do. do. do do. 3rds	do.	0	0	6		—	
Do. English patent plain rolled plate in stock crates ⅛	do.	0	0	2		—	
Do. do. do. 3/16	do.	0	0	2¼		—	
Do. do. do. ¼	do.	0	0	2		—	
Granite Chippings ...	do.	0	10	6		—	
Do. do. ¾in. ...	do.	0	11	6		—	
Do. Broken, 1½in. ...	do.	0	15	6		—	
Do. do. 2in. ...	do.	0	15	0		—	
Do. do. 2½in. ...	do.	0	14	6		—	
Do. Kerb, Norwegian 6×12 and 12×6 in river	per foot	0	1	2		—	
Do. do. do. circular	do.	0	1	5		—	
Do. do. do. 12×8 in river	do.	0	1	5		—	
Do. do. do. circular	do.	0	1	8		—	
Do. do. Guernsey 6×12 in river	do.	0	1	4		—	
Do. do. do. circular	do.	0	1	6		—	
Do. do. do. Special 4×6	do.	1	11	0		—	
Do. do. Guernsey 3×6	do.	1	10	0		—	
Do. do. do. 3×7 & 3×9	do.	1	8	6		—	
Do. do. do. 3×5	do.	1	10	0		—	
Castor Oil, French ...	per cwt.	1	9	0		—	
Colza Oil, English ...	do.	1	12	9		—	
Copperas	per ton	2	0	0		—	
Lard Oil	per cwt.	2	15	0	2	17	0
Lead, white, ground, carbonate	per ton	16	0	0		—	
Do. red	do.	15	0	0	19	0	0
Linseed Oil, barrels ...	per cwt.	1	3	0		—	
Petroleum, American ...	per gal.	0	0	6¾	0	0	6⅞
Do. Russian ...	do.	0	0	6¼	0	0	6⅜
Pitch	per barrel	0	12	0		—	
Shellac, orange	per cwt.	10	16	0		—	
Soda, crystals	per ton	3	2	6	3	5	0
Tallow, Town	per cwt.	1	13	0		—	
Tar, Stockholm	per barrel	1	5	0		—	
Turpentine	per cwt.	2	12	3		—	

METALS.

		£	s.	d.	£	s.	d.
Standard Copper	per ton	101	10	0	102	0	0
Do. Strong sheets ...	do.	118	0	0	119	0	0
Lead, soft foreign	do.	19	10	0	20	0	0
Do. English	do.	20	10	0	20	15	0
Do. pipes...	do.	23	5	0	23	10	0
Do. sheets	do.	23	0	0	23	10	0
Galvanised Corrugated sheets	do.	13	12	6	13	15	0
Spelter G. M.	do.	25	15	0	26	0	0
Angles, Scotland	do	7	0	0	7	2	6
Bars, do.	do.	7	15	0	7	17	6
Marked bars, Staffs. ...	do	9	0	0	9	2	6
Common bars, do. ...	do.	7	0	0	7	5	0
Angles, M'boro.	do.	7	0	0	7	2	6
Joists do.	do.	6	15	0	6	17	6
Angles, Midlands	do.	7	0	0	7	5	0
Joists do.	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	5	0	7	7	6
Tees do. do. do.	do.	7	7	6	7	10	0
Joists, do. do. do.	do.	6	10	0	6	12	6
Channels do. do. do.	do.	6	12	6	6	15	0
Tin, Foreign	do.	191	0	0	192	0	0
Do. English ingots ...	do.	196	0	0	197	0	0
Zinc, sheets, Silesian, f.o.b.	do.	31	10	0	32	0	0
Do. do. V.M. do.	do.	31	0	0	32	0	0

TIMBER.

Soft Woods.

		£	s.	d.	£	s.	d.
Fir, Dantzic and Memel	per load	3	10	0	5	0	0
Pine, Quebec, Yellow ...	do	3	12	6	6	5	0
Do Pitch, American ...	do	4	7	6	5	0	0
Laths, log, Dantzic	per cu. fath.	4	0	0	6	0	0
Do Altappen & Gran-							
Do Kemi, Yellow,							
Beams	per qr.	1	11	0	1	14	0
Deals, Archangel White, 1st, 3×11	per std.	14	10	0		—	
Do. do. do. 2nd, 3×11	do.	12	5	0		—	
Do. do. do. do. 3×9	do.	9	10	0		—	
Do. do. Yellow, do. 3×9	do.	15	0	0	15	5	0
Do. do. do. 3rd, 2½×9	do.	11	5	0		—	
Do. do. do. 4th, 4×11	do.	8	5	0	8	10	0
Do. Aryd, Yellow, unsorted, 3×4	do.	9	5	0		—	
Deals, Gefle, Yellow, unsorted, 2½×7	do.	9	10	0		—	
Do. Hudikswall, Yellow, 5th, 2½×7	do.	9	10	0		—	
Do. Keret, Yellow, 3rd, 3×9	do.	10	0	0		—	
Do. Kovda, Yellow, 2nd, 3×9	do.	12	15	0		—	
Do. Mesane, Yellow, 3rd, 3×9	do.	10	5	0	10	10	0
Do. Petschora, Yellow, 2nd, 3×11	do.	16	0	0		—	
Do. do. do. do. 3×9	do.	14	0	0		—	
Do. do. do. 3rd, 4×9	do.	10	15	0		—	
Do. St. John, Spruce, unsorted, 3×7	do.	7	15	0	8	0	0
Battens, Archangel, Yellow, 3rd, 2×11	do.	10	5	0		—	
Do. Aryd, White, unsorted, 2×3	do.	7	15	0		—	
Do. Hernösand, Yellow, 2×5	do.	5	0	0		—	
Do. do. do. 2×4½	do.	5	0	0		—	
Do. Helsingfors, Yellow, unsorted, 2×3½	do.	8	5	0		—	
Do. Hudikswall, Yellow, 5th, 2×9	do.	10	0	0		—	
Do. Ingramport, Yellow, unsorted, 2×3	do.	6	15	0	7	0	0
Do. do. do. do. 2×4	do.	7	0	0	7	5	0
Do. Kem, Yellow, dry, 3rd, 2×9	do.	10	15	0		—	
Do. Marsom's, Spruce, unsorted, 2×7	do.	8	10	0		—	
Do. Riga, Yellow, dry, 1st, 2×7	do.	12	5	0		—	
Do. do White, unsorted, 2×7	do.	8	0	0	8	5	0
Do. Stockholm, Yellow, unsorted, 2×6	do.	9	0	0		—	
Do. Wartsala, Yellow, unsorted, 2×4	do.	9	10	0		—	
Flooring Boards, Ljusne, Yellow, 2nd, 1×5	do.	0	8	3		—	
Do. Mon, Yellow, 1st, 1¼×6	do.	0	14	6	0	14	9
Do. do. do. do. 1×6	do.	0	11	6	0	12	3
Do. do. do. 2nd, 1¼×6	do.	0	13	9		—	
Do. do. do. do. 1×6	do.	0	11	0		—	
Do. do. do. 3rd, 1×6	do.	0	10	0		—	
Do. Sikea, Yellow, 1st, 1¼×6½	do.	0	13	6		—	
Do. do. do. do. 1×6½	do.	0	10	9		—	
Do. do. do. 2nd, 1¼×6½	do.	0	12	9		—	
Do. do. do. do. 1×6½	do.	0	10	6		—	
Do. do. do. 3rd, 1¼×6½	do.	0	12	0		—	
Do. do. do. do. 1×6½	do.	0	9	6		—	
Do. Söderhamn, White, 1st & 2nd, 1×7	do.	0	10	3		—	
Do. do. do. do. 1×6	do.	0	10	0		—	
Do. Sundswall, Yellow, 2nd, 1¼×6	do.	0	13	3		—	
Do. do. do. do. 1¼×5½	do.	0	12	0		—	
Do. do. do. do. 1×5½	do.	0	10	3		—	

Hard Woods.

		£	s.	d.	£	s.	d.
Ash, Quebec	per load	4	2	6	7	5	0
Birch, New Brunswick ...	do.	2	7	6	5	0	0
Do. Quebec	do.	2	7	6	5	0	0
Cedar, Cuba	per ft. sup.	0	0	4	0	0	5
Do. Honduras	do.	0	0	4	0	0	5
Elm, Quebec	per load	4	0	0	9	5	0
Jarrah, planks	per ft. cu.	0	2	6	0	3	0
Mahogany, Average Price for Cargo, Honduras	per ft. sup.	0	0	4½	0	0	5½
Do. Cuba ...	do.	0	0	4	0	0	6
Do. African ...	do.	0	0	3¾	0	0	5½
Do. Lagos ...	do.	0	0	4	0	0	5½
Oak, Wainscot	per log	2	5	0	5	10	0
Teak, Indian, logs ...	per load	9	5	0	20	0	0
Do. do. planks ...	do.	13	5	0	21	0	0
Whitewood, American, logs	per ft. cu.	0	3	3	0	1	6
planks and boards ...	do.	0	3	3	0	3	9

Partnerships

Cronk & Hanson, builders, West Ealing (March 9).

Milton Brothers, builders, Bedminster (March 25).

J. & A. England, builders, Cheadle Hulme (Dec. 31). Debts by J. England.

Glen & Moffett, builders and contractors, Jarrow (March 5). Debts by D. Glen.

Bartle & Thackeray, joiners and builders, Brighouse (April 3). Debts by S. Bartle.

Stretton & Gibson, builders and contractors, Audlem (March 25). H. L. Gibson continues.

C. Noel Legh & Co., timber merchants, Liverpool (Jan. 1). Debts by C. N. Legh, who continues.

Jones & Sons, building contractors, Liverpool (Dec. 31, 1905). Debts by R. S. Jones, who continues.

A. & H. Watts, painters and house decorators, Bristol (Feb. 19). Debts by A. Watts, who continues.

Benjamin Williams & Son, timber merchants, Old Hill (March 27). Debts by B. Williams, junr., who continues.

David Davies & Sons, builders and contractors, Cardiff (March 30). Debts by D. Davies. S. & J. Davies continue.

George Beckwith & J. A. Webster, architects and surveyors, Leeds (April 1). Debts by J. A. Webster, who continues.

W. H. Watts & Co., builders and contractors, Hampstead (March 25). W. H. Watts, jun., continues in his own name.

Jno. Marsland & Sons, builders and contractors, Walworth (March 25). Debts by J. Marsland, jun., and F. Marsland, who continue.

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INCIDENTS IN THE BUILDING TRADES OF LONDON IN THE XIVth AND XVth CENTURIES.

By W. Culling Gaze.

The following brief glimpses of incidents in the building trades of London in the 14th and 15th centuries are principally gathered from H. T. Riley's "Memorials of London and London Life": a series of translations from the original Norman-French or Old English of local, social and political extracts from the early archives of the City of London, between 1276 and 1419:—

A Heavy Fine for Abusive Words.

On Monday, August 10th, 1298, two master-masons, Simon de Pabington and Richard de Wetham, appeared before the mayor and aldermen to answer for abusive words that had passed between them. They were reconciled, and agreed "each for himself, that if either of them should be able to give information against the other that he had by the same abusive words, or, indeed, committed trespass against the other, and such person should, upon the faith of two trustworthy witnesses, be found guilty thereof, he should give 100 shillings towards the fabric of London Bridge."

Straw-thatch and Fires.

At the opening of the 14th century the houses of London were nearly entirely roofed with straw-thatch, and the frequent fires had prompted the city authorities to issue several orders against this dangerous roof-covering, but with little effect. On January 13th, 1302, Thomas Bat came before the mayor and aldermen, and bound himself "to keep the City of London indemnified from peril of fire and other losses which might arise from his houses covered with thatch, in the parish of St. Laurence Candelwykstrete; and he agreed that he would have the said houses covered with tiles about the Feast of Pentecost then next ensuing." This work was to be paid for out of the rents of the houses.

Construction of Houses.

The material of houses was generally of wood, and the constructors were ordinarily carpenters in those days. An instance of this occurred on November 11th, 1308, when Simon de Canterbury, a carpenter, agreed, before the Mayor and Aldermen, to construct "at his own proper charges, down to the locks," an addition to an old house, for William de Hanington, pelterer or skinner, before the next Feast of Easter. The accommodation specified was to consist of a hall and a room with a chimney; a larder between the hall and room; a "sollar," or sun-chamber, over the room and larder; an "oriole" (probably a recess with a bay window) at the end of the hall, "beyond the high bench"; a step with an "oriole" (probably a porch in this instance) from the ground to the door of the hall, on the outside; two enclosures as cellars, opposite to each other, beneath the hall; an enclosure for a sewer, with two pipes leading to the same; a stable (a space for the length omitted), twelve feet wide, between the new hall and the old kitchen; a "sollar" over this stable, having at the end a kitchen with a chimney; a garret above the "sollar"; and an "oriole" (probably a room with a bay window), eight feet wide, between the said hall and the old chamber. For this work William de Haningtone bound himself to pay Simon "the sum of £9 5s. 4d. sterling, half a hundred of Eastern martenskins (probably an inferior kind of sable), fur for a woman's hood, value five shillings, and fur for a robe of him, the said Simon, etc."

The Good Old Days.

On Ascension-day (May 20th), 1327, a terrible fight took place, in Chepe and Crepelgate, between the saddlers of the City of London and the joiners, painters, and lorimers, or makers of bits and ornamental metalwork for reins in copper and iron. Some on both sides were killed, and many mortally wounded; and the affray was only suppressed, with much difficulty, by the intervention of the mayor, sheriffs, and city officers. The men of the several trades involved appeared at the Guildhall, when it came out that the cause of the quarrel rested with the saddlers, who had abused the other trades, and refused to pay them their just debts. After a conference between the opposing parties, an agreement of peace was drawn up, which said:—"That if the saddlers aforesaid, or any one of them, or any of their successors, shall at any time to come, after this present time, offend against the joiners, lorimers, and painters, aforesaid, or shall maintain any one of their household, or any other person whatsoever, in so doing, and shall thereof, by good and lawful persons, be convicted, and will not in due form make amends; then in such case, the saddlers aforesaid do will and do grant for themselves and for their successors, that they shall be bound to pay unto the joiners, lorimers, and painters aforesaid, ten tuns of good wine, and to render the same within one month next ensuing after the offence of which conviction shall have been so made; and, also, other ten tuns of good wine unto the Mayor and the commonalty of London, at the same time to be paid and rendered." The joiners, painters, and lorimers bound themselves to a similar forfeit for any offence they might commit in the future against the saddlers.

Certain of the ringleaders amongst the saddlers were ejected from the fraternity of their trade, and anyone found guilty of taking them, or any one of them, back, or rendering them any assistance, was to pay a fine of ten tuns of wine each to the joiners, painters, and lorimers, and the Mayor and commonalty of London.

The trades of the joiners, painters, and lorimers further petitioned the Mayor, Aldermen, and Commonalty, "That no stranger, of whatsoever condition he may be, shall be admitted to, or suffered to follow, any of the said trades in the said city, before he shall have been received at the Husting in presence of the Mayor and the Aldermen, by assent of eight reputable men who shall be chosen to keep and oversee the same trades; and shall have found for the commonalty sufficient surety among persons of the same trades, as he is bound to do. And that if any person shall be found to contravene the ordinance aforesaid, he may be amerced in the sum of one mark."

Prices of Material.

On November 1st, 1350, John Little and James Andreu, the new wardens of London Bridge, received from Aleyn Gille and John de Hardingham, the outgoing wardens, an inventory and valuation of the stores belonging to the works, in the court of the old Bridge House in Southwark. The following curious items occur:—400 great pieces of oak timber, value 40d. by the piece, making 100 marks. A pile of timber, lying in the garden close adjoining to the water of Thames, valued at 20 marks. Timber for 14 shops, fully wrought and framed for immediate building, £36. Divers pieces of timber lying in various places in the said court, valued at £19 6s. 8d. 120 pieces of elm for piles, at 2s. the piece, £12. In the grange 125 rakes (for catching refuse carried down by the stream), at 5d. each, 52s. 1d. Divers boards of oak and of "estrichesborde" (deal boards, from the Eastern Countries, probably on the Baltic), value £6 12s. 4d. 57,000 "hertlathes" (superior laths, of the heart of wood), value 4s. per thousand, £11 8s. 30,000 "saplathes" (laths, with the sap in the wood), value 2s. per thousand, £3. Also 690 feet of stone of Portelond, hand-worked and squared, also 1,044 ft. of stone of Portelond, not wrought, the total being 1,734 pieces, value 5d. per piece, £36 3s. 11d. 600 of "coynston" (quoin or corner stones), value 5s. per hundred, 40s. (correctly 30s.). 18 great stones of Bere (probably from Bere Regis in Dorset), weighing 18 tons, value 6s. 8d. per ton, £6. A heap of mixed mortar, value £4 8s. 12,000 tiles, value 8s. per thousand, £4 16s. Cement for the bridge, £3. 7 barrels of pitch, value 4s. per barrel, 28s. Two boatloads of "ragston," value 23s. One boatload of chalk, value 7s. 6d.

Also, in the "werkhous":—7½ weys of old lead, value 6s. 8d. per wey, 50s. 12,000 of "plaunchenail" (plank-nails), value 4s. per thousand, 48s. 3,000 of "dornail" (door-nails), at 2s. 6d. per thousand, 7s. 6d. 400 large nails for the draw-bridge, at 12d. per hundred, 4s. One mazer, with a silver foot, value 10s. 3,000 great "plaunchesnail," and 7,200 "dornail," the total whereof is 10,200, at 4s. the thousand, 40s. 10d. 2,600 of "wyndounail" (window-nails), at 2s. 6d. the thousand, 6s. 6d. 23,000 of "rofnail" (roof-nails), at 12d. the thousand, 23s. 9,000 of "traversnails" (tree-nails), at 8d. the thousand, 6s.

Also, in the chapel:—A "pokete" (pocket, poke, or bag). 2,500 of "wyndounail," at 2s. 6d. the thousand, 6s. 6d. 500 "grapes" (prongs) of iron, at one penny each, 41s. 8d. 18 pieces of new cord, weighing 1,640lb., at 8s. per hundred, £6 11s. 100 irons for piles, value 4d. per iron, 36s. 8d.

There were also delivered up, but not valued:—One great boat, and one small boat, and one "shoute" (schuyt, a barge for timber probably). Two engines with three "rammes," for ramming piles. Two cauldrons for melting pitch for cement. One presser for fixing. Five pots of brass; and four posnets, old and worn out.

Wages.

This same year, also, regulations were made regarding wages and prices in the city:—"To amend and redress the damages and grievances which the good folks of the city, rich and poor, have suffered and received within the past year, by reason of masons, carpenters, plasterers, tilers, and all manner of labourers, who take immeasurably more than they have been wont to take." All classes of labour and material, in the city, had fixed rates placed upon them; and the clauses affecting the building trades were these:—"That the masons, between the Feasts of Easter and St. Michael (September 29th), shall take no more by the working-day than 6d., without victuals and drink; and from the Feast of St. Michael to Easter, for the working-day, 5d. And upon Feast-days, when they do not work, they shall take nothing. And for the making or mending of their implements they shall take nothing. That the carpenters shall take, for the same time, in the same manner. That the plasterers shall take the same as the masons and carpenters take. That the tilers shall take for the working-day, from the Feast of Easter to St. Michael, 5½d. and from the Feast of St. Michael to Easter 4½d. That the labourers (garsons) shall take in the first half year 3½d., and in the other half, 3d. That the master-daubers (layers on to a framework a mixture of straw and mud) shall take between the Feasts of Easter and St. Michael, 5d., and in the other half year, 4d.; and their labourers are to take the same as the labourers of the tilers. That the "sawiers" shall take in the same manner as the masons and carpenters take. That no one shall pay more to the workmen aforesaid, on pain of paying 40s. to the Commonalty, without any release therefrom; and he who shall take more than the above, shall go to prison for 40 days. That the thousand of tiles shall be sold at 5s. at the very highest. That the hundred of lime shall be sold at 5s., at the very highest. That a cart with sand, and with clay, that comes from Algate as far as the Conduit (in Chepe), shall take 3d. for its hire; and if the cart shall pass the Conduit, let it take 3½d. And in the same manner, let the carts from Crepulgate to Chepe take 3d.; and if they pass that place, 3½d. And if the cart with sand, or with clay, shall not enter the City, but only bring it to serve folks who live in the suburbs without the Gates, let it take 2d.; and let the carts be of the capacity of one quarter, well heaped up, as they used to be. If any workman or labourer will not work or labour as is above ordained, let him be taken and kept in prison until he shall have found good surety, and have been sworn to do that which is ordained. And if anyone shall absent himself, or go out of the city, because he does not wish to work and labour, as is before mentioned, and afterwards by chance be found within the city, let him have imprisonment for a quarter of a year, and forfeit his chattels which he have in the city, and then let him find surety, and make oath, as is before stated. And if he will not do this, let him forswear the city for ever."

A "Strike" at Westminster.

Something very nearly resembling our present-day strike must have occurred on the works at the Palace of Westminster, for on July 28th, 1353, King Edward III. issued this proclamation:—

"Edward, by the Grace of God, etc., to the Sheriffs of London and Middlesex, greeting. Whereas many workmen and labourers, who were retained upon our works at our Palace at Westminster, and were receiving our wages, have withdrawn from such our works without leave, and have been received to work for divers men of the city and county aforesaid, within the same city and county, as we have been given to understand; in contempt of us, and to the damage and manifest retardation of our works aforesaid; we, wishing in this behalf such remedy to be applied as is befitting, do command you, that in the city and county aforesaid, in such places as you shall deem most expedient, you do cause public proclamation to be made, and it in our behalf strictly to be forbidden, that anyone shall, on pain of imprisonment of his body at our will, and of grievous forfeiture unto ourselves, receive any such workmen upon his works, of whatsoever calling they may be, who shall have been before retained upon our works aforesaid (unless they shall have had leave to depart therefrom), or in any way retain the same. And if, after the proclamation and prohibition aforesaid, you shall find any such workmen who have been before retained in our service, and have not had leave to depart therefrom, received upon the works of other persons of the city and county aforesaid, then you are to cause as well such workmen as their receivers to be taken, and the workmen to be brought back to our palace aforesaid, there to be set upon such our works; and the receivers of them to be sent to our Tower of London without delay, there in prison at our will to remain."

Regulations for Masons.

At a congregation of the Mayor and Aldermen, held on February 2nd, 1356, regulations were made for the trade of masons: to settle "the dissensions and disputes" of the "masons who were hewers," on the one hand, and "light masons and setters," on the other.

The articles were:—"That every man of the trade may work at any work touching the trade, if he be perfectly skilled and knowing in the same. That good folks of the said trade shall be chosen and sworn every time that need shall be, to oversee that no one of the trade takes work to complete, if he does not well and perfectly know how to perform such work; on pain of losing, to the use of the Commonalty, the first time that he shall by the persons so sworn be convicted thereof, one mark; and the second time, two marks; and the third time, he shall forswear the trade for ever. That no one shall take work in gross (wholesale or by contract) if he be not of ability in a proper manner to complete such work; and he who wishes to undertake such work in gross, shall come to the good man of whom he has taken such work to do and complete, and shall bring with him six or four ancient men of his trade, sworn thereunto, if they are prepared to testify unto the good man of whom he has taken such work to do, that he is skilful and of ability to perform such work, and that if he shall fail to complete such work in due manner, or not be of ability to do the same, they themselves, who so testify that he is skilful and of ability to finish the work, are bound to complete the same work well and properly at their own charges, in such manner as he undertook; in case the employer who owns the work shall have fully paid the workman. And if the employer shall then owe him anything, let him pay it to the persons who have so undertaken for him to complete such work. That no one shall set an apprentice or journeyman to work, except in presence of his master, before he has been perfectly instructed in his calling; and he who shall do the contrary, and by the persons so sworn be convicted thereof, let him pay, the first time, to the use of the Commonalty, half a mark, and the second time, one mark, and the third time, 20 shillings; and so let him pay 20 shillings every time that he shall be convicted thereof. That no one of the said trade shall take an apprentice for a less term than seven years, according to the usage of the city; and he who shall do to the contrary thereof, shall be punished in the same manner. That the said master, so chosen, shall oversee that all those who work by the day shall take for their hire according as they are skilled, and may deserve for their work, and not outrageously. If any one of the said trade will not be ruled or directed in due manner by the persons of his trade sworn thereunto, such sworn persons are to make known his name unto the Mayor; and the Mayor, by assent of the Aldermen and Sheriffs, shall cause him to be chastised by imprisonment and other punishment; that so, other rebels may take example by him, to be ruled by the good folks of their trade. That no one of the said trade shall take the apprentice or journeyman of another, to the prejudice or damage of his master, until his term shall have fully expired; on pain of paying, to the use of the Commonalty, half a mark, each time that he shall be convicted thereof."

Tolls.

In 1356 a royal order was issued for the collection of moneys at the city gates, for the repair of the roads. A toll-rate was fixed for all vehicles entering the city:—3d. per week being the charge for carts bringing sand, gravel, and clay.

(To be concluded.)

The Month's Trade

(Reports by our Special Correspondents.)

THE CLAYWORKING INDUSTRY.

The improvement in the clayworking trade which has been noticeable in the last few months still continues. In the Fletton district there has been a considerable output of bricks during the past month, and fair prices have been realised. There has been a good demand locally for Fletton bricks, in consequence of increased activity among local builders in the erection of houses for the considerable number of workmen who will be employed at the new works which are to be opened shortly. Few bricks seem to be stacked in the various yards, some of which are working at high pressure, so the prospects look very promising. In the trade it is believed that this summer the demand will be greater than for several years past. Employment has, however, continued slack at Ruabon, Wrexham, and Nottingham, while it has also been dull in Shropshire and the Plymouth district. At Exeter the brick and tile trades have been moderately employed; but an improvement is shown on previous months of this year and upon a year ago. In Birmingham, Stourbridge, Ipswich, and in South Staffordshire, Tees, and Hartlepool districts employment has been fair. In South Wales and Monmouthshire it has continued good. On the whole, therefore, while trade is good in those districts where the engineering and cotton trades are chiefly centred, in the South of England, particularly London, the building trade is slack and affects the brick and tile trades particularly.

There is not the slightest doubt that the disastrous lamination which is constantly taking place with roof tiles is avoided by the use of hard, well-burnt plastic handmade tiles. Messrs. Roberts, Adlard and Co., the well-known roofing contractors, are supplying a tile of this description eminently suitable for first-class work. The colour obtainable ranges from a rich red to a brown, and samples will be forwarded by the firm on application. One of the many advantages of this tile is the fine effect it gives. There is none of the stereotype monotony about the tile. It is refreshing to look at, and when laid has an old-fashioned, artistic appearance. As an ideal practical roof covering it is unsurpassed. This firm has also at the disposal of architects samples of the coloured glazed roofing tiles mentioned by us in a former issue. The green glazed is now being used by them on Gloucester House Flats, corner of Park Lane and Piccadilly, London.

THE STONE, GRANITE, MARBLE, AND SLATE TRADES.

As regards the general aspect of the stone trade we have little to add to our last report—namely, that trade was slowly but steadily improving in sympathy with the building trade generally. During the past month good reports have been received from those districts closest to the centre of expanding trade—namely, the Midlands. In the South trade is not so abundant. For instance, we may refer to the Bath stone quarries, where employment has been reported as bad. In Scotland, too, the stone trade is slack. However, the trade is recovering from the long depression, and it is to be hoped by next spring, at any rate, the whole of the building trade, in every branch, will be prosperous once more, for the boom in the chief trades of this country still continues unabated—indeed, if anything, on the increase.

In the limestone quarries employment in the past month has continued good in Weardale and Cleveland and the Gateshead districts. In Derbyshire and the Plymouth districts and North Wales employment has continued fair. In the Bath stone quarries employment has been very dull. In the Somerset blue lias quarries, where employment was reported as bad, there has been a slight improvement.

Employment has continued good in the Sheffield district and in the Cleehill quarries. A further improvement has been shown in the Gateshead district, while in the building stone quarries in the Rowsley district employment has continued moderate. In the Gloucestershire pennant stone quarries employment has continued dull, while in Forfarshire employment is reported to have continued to be bad.

As regards the granite industry, in the English and Scottish quarries employment is slightly improved; but of course, at the present time, so far as granite for architectural purposes is concerned, the great strength lies in Norwegian material. As is common knowledge now, the Norwegian granite quarries possess the best resources, both natural and artificial, for the production of granite. So economically is the material quarried and worked that the price of Norwegian granite compares well with that of worked stone of the best quality, and it is becoming extensively adopted for buildings in our large cities, to which the material is admirably adapted. The two most striking examples in this line are, undoubtedly, in London, the Ritz Hotel and the "Morning Post" building, both of which were carried out by Mesrs. A. and F. Manuelle in a very fine whitish quality of Norwegian granite.

As regards the quarries in Aberdeenshire, employment among granite workers in the past month has continued fair. In the Leicestershire quarries it has been somewhat dull, and worse than a month ago. In the quarries on Dartmoor things have been quiet; while in quarries in the Penryn district employment has been bad, although perhaps slightly better than a month ago.

As regards settmakers, employment has continued fair in Aberdeenshire, at Airdrie, and in North Wales. It has been fair at Glasgow, and also at Rowley Regis (Staffs). In Leicestershire employment has been reported as improved, though somewhat dull. Employment has continued dull in the Clee Hill district.

The slate trade in the past month has continued to show an improvement. Nothing startling is happening, but orders are steadily coming in and stocks are being reduced, although they still remain heavy. In the Festiniog district in North Wales employment is reported as slack, but it is slightly better than it was a month ago. There has also been a slight improvement in the slate quarries on a month ago at Ballachulish, Argyllshire, where employment is reported as fair.

A case which was recently heard at Ystrad Police Court, and reported on page 245 of our issue for May 15th last, calls attention to possible breaches of the Merchandise Marks Act, because in this instance it was proved that a false trade description had been applied to slates supplied by a firm of builders' merchants. We have heard that this is not an uncommon practice, although seldom exposed in court nor receiving full publicity. There is far too much of this substitution of materials in the building trade in many directions other than roofing slates.

The returns for imports of stones, slabs and marble, rough, hewn and manufactured, for the month of April, 1907, as compared with the same month in 1905 and 1906, are as follows :—

Tons.			Value.		
1905.	1906.	1907.	1905.	1906.	1907.
97,768	109,274	102,312	102,640	115,492	111,223

THE PORTLAND CEMENT TRADE.

No particular feature of interest presented itself in the Portland cement trade during the past month. The building trades in London. speaking generally, and also in the provinces, continue slack, although here and there, notably in Lancashire, there are pleasing exceptions. Manufacturers of Portland cement, however, continue busy, still being largely employed on foreign orders, which show no sign of slackening.

It is especially noteworthy that reinforced concrete work abroad is advancing by leaps and bounds and has opened up an enormous field for the use of cement such as was not dreamed of a few years ago. On the Pacific Coast of America and in the United States generally, on the Continent of Europe, in India, and many other countries over-seas, it is becoming now the rule and not the exception to employ the new system in all forms of constructional work. Sooner or later we shall follow in this country and with practically all our leading contractors and builders now becoming interested in one or other of the various systems which are available, we may look for some considerable developments in the near future which will bring joy to the heart of the cement maker. Some change in the existing building bylaws, which are now in many respects quite out of date, will doubtless ensue as the result of the labours of the Committee on Reinforced Concrete appointed by the Royal Institute of British Architects, whose report is published in our issue this week. When the architect has learnt to appreciate reinforced concrete as the engineer has already done, we shall soon see a greatly extended use of it in this country. There has been no change in the prices of Portland cement since we last wrote, and the home prices continue low, having regard to the increased cost of production; makers, however, are hoping for an early advance. Exports and imports continue to look well, the former for the month of April showing a considerable increase, and the latter a substantial diminution over the corresponding month of last year.

H.M.'s Consul at Helsingfors (Mr. C. J. Cooke) reports that the import into Finland of so-called "Portland" cement amounted to 43,712 metric tons in 1906, against 30,077 metric tons in 1905. More than half of the total came from Germany, about 13,000 metric tons from Sweden, and the rest from Denmark, Belgium, Norway, and Russia.

The returns of imports and exports of cement for building and engineering purposes for April, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.

	1905.	1906.	1907.
Tons -	- 21,038	17,375	13,149
Value -	- £25,994	21,629	17,377

EXPORTS.

	1905.	1906.	1907.
Tons -	- 33,348	50,872	76,487
Value -	£51,920	75,293	124,830

IRON AND STEEL TRADES.

The condition of the pig-iron market is very satisfactory. The makers are busily employed, prices have risen to a high level, the demand abroad is such that it cannot be supplied locally, and calls are therefore made on England, while the home demand continues to slowly improve. Some speculative influence tends to make prices fluctuate a little, but the real position is so strong that the market is rapidly becoming in that happy state that speculation will be unable to set prices back. The public stores stocks are a great factor in this situation, and the strength of the position lies in the fact that they have been greatly reduced in the last few months, and that orders for material continue to be received from home and abroad that will reduce them still more. At the present time the stocks at Middlebrough amount to about 350,000 tons, whereas this time last year it was 680,000 tons. Prices of pig-iron in the United States have risen so that there is a good margin on English material, though this is being reduced by the rise in price in our market. However, export orders from the United States and Germany continue to be received and stocks to diminish rapidly. Instead of the increased prices keeping back orders they seem to have made them more active.

In the manufactured iron and steel branch the increased cost of pig iron tends to harden prices for finished material. Orders which were held back until a short time ago seem now to be coming forward in a greater quantity than is usually the case at this period, and so the immediate future looks healthy. The shipbuilding trade always affects this market to a great extent, and this is not quite so vigorous as it might be, but it seems to be improving.

As regards Belgian joists the price remains unchanged at late rates, and any advance would only be small, as the building trade is not exactly booming at present.

The Belgian steelworks have been waiting for the renewal of the German ring, and now this has been decided for another five years they have renewed their agreement.

The return for imports and exports in certain branches of manufactured iron and steel for the month of April, 1907, as compared with the same month in 1905 and 1906 are as follows:—

		IMPORTS.			EXPORTS.		
		1905.	1906.	1907.	1905.	1906.	1907.
Puddled Iron - - - - - - - - -	- tons	6,370	3,697	2,931	86,158	114,099	187,274
Wrought iron, in bars, angles, rods and sections - - - -	-	4,416	8,247	4,689	10,113	12,351	14,425
Rails - - - - - - - - - - - - - -	-	6,472	734	1,030	37,190	32,841	40,003
STEEL:—Girders, beams, joists and pillars from Belgium -	-	5,056	9,134	2,944	4,262	10,092	9,082
" " " " other countries	-	2,369	4,536	3,782			
Ingots, blooms, billets, slabs, sheet bars, tin plate bars, or similar partly manufactured - - - - - - - -	-	55,358	49,151	22,992	2,570	850	981
Bars, angles, rods and shapes or sections - - - - - -	-	2,986	4,365	1,008	9,146	13,949	20,951
Galvanized sheets (flat or corrugated) - - - - - - -		—	—	—	30,816	33,764	39,572

OTHER METALS.

The copper market experienced a sharp fall in prices in the past month, due to speculative influences, but prices are hardening again, for the great shortage in the supply continues.

The tin market has undergone some speculative influence and a slight fall in prices, but the intrinsic position is so strong that there is nothing to fear. The demand continues much greater than the supply.

In the lead market there is no change to report. Everything is satisfactory.

THE IRONMONGERY TRADES.

Employment in the lock and latch trades has continued bad at Wolverhampton and Willenhall. At Wolverhampton it has been good in all branches of the hollow-ware trade. It has been quiet with hollow-ware makers at West Bromwich; slack with hollow-ware stampers and buffers at Sheffield.

Employment has been quiet in the stoves, grates, &c., trades at Rotherham; fair at Falkirk; good at Glasgow.

Employment is reported as having been good with nut, bolt, and wire nail makers at Birmingham. At Darlaston it has been good with nut and bolt makers. At Blackheath it has been good with bolt, rivet, &c., makers.

Employment among wireworkers has continued good generally.

The returns for imports and exports for April, 1907, as compared with the same month in 1905 and 1906 are as follows:—

IMPORTS.

	Tons.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907.
Wire nails - - - - - - - - - -	3,591	3,763	3,187	£36,111	36,666	33,900
Nails (other than wire nails), screws and rivets -	1,042	994	736	17,136	14,373	11,695
Bolts and nuts - - - - - - - - -	467	766	500	7,568	12,553	9,277

EXPORTS.

Nails, screws and rivets - - - - - - -	1,848	2,557	2,957	36,687	46,021	53,373
Bolts and nuts - - - - - - - - - -	1,113	1,806	2,198	19,375	32,478	42,407

THE WALLPAPER TRADE.

The following is the return of paper-hangings issued by the Board of Trade for April, 1907, as compared with the same month in 1905 and 1906:—

IMPORTS.

	1905.	1906.	1907.
Cwts. -	- 5,504	4,737	5,703
Value -	- £14,638	13,222	16,034

EXPORTS.

	1905.	1906.	1907.
Cwts.	- 7,811	7,094	8,090
Value	- £19,247	17,676	17,629

The wallpaper trade continues to show a fair amount of prosperity. The reports of imports and exports are interesting. They continue to show that a greater quantity and a greater value of wallpaper is being exported this year than last. Not only are the figures for April better than the same month in 1906 and 1905, but the figures for the first four months of the year are considerably better than the first four months in the two former years. It is a peculiar fact, however, that the imports of paper-hangings have also increased both in quantity and in value. The proportionate figures were a few months ago in favour of the imports. But now the export figures are going ahead. For instance, for the first four months of this year the value of imports of wallpapers have been 5 per cent. better than last year, and 31 per cent. better than for the same period of 1905. The exports, on the other hand, have only improved 16 per cent. on last year, the figures for which were about stationary as compared with the same period in 1905. Analysing the figures, we see that the chief increase in imported papers has come from Germany and the Netherlands. The greater quantity of imported paper-hangings, however, comes from Belgium, and the chief increase of the figures of 1906

THE PAINT TRADES.

The paint trades continue fair. As regards materials, the returns for imports and exports for April, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.

		Quantity.			Value.		
		1905.	1906.	1907.	1905.	1906.	1907.
White lead - - - - - - -	Cwts.	24,875	28,113	23,119	£20,126	24,979	23,102
Zinc oxide - - - - - - -	-	18,797	22,870	23,771	19,125	24,941	26,500
Other colours and pigments - - - - -	-	152,145	117,618	124,840	85,429	67,500	85,249
Turpentine - - - - - - -	-	33,710	12,430	14,562	66,274	17,793	19,927
Lac-dye, seedlac, shellac and sticklac - -	-	8,317	9,846	13,449	59,713	93,252	134,807
Linseed oil - - - - - - -	- Tons	846	2,433	767	15,613	48,664	16,899

EXPORTS.

White lead - - - - - - -	- Cwts.	26,464	30,089	34,519	24,042	32,125	40,754
Zinc oxide - - - - - - -	-	6,087	5,479	7,217	7,946	6,483	9,370
Other colours and pigments - - - - -	-	118,007	111,148	134,679	155,906	158,895	190,218
Linseed oil - - - - - - -	- Tons	5,324	2,137	2,682	92,557	50,454	69,547

THE GLASS TRADE.

In the past month employment with plate-glass bevellers at Birmingham has been reported as fair, while employment with sheet-glass flatteners and makers at St. Helens has continued good. With London glass-blowers employment has also been fairly good.

The returns for imports and exports of glass for the month of April, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.

	Cwts.			Value.		
	1905.	1906.	1907.	1905.	1906.	1907.
Window and German Sheet, including shades and cylinders	78,851	126,515	105,128	£45,579	69,905	57,990
Plate - - - - - - - - -	38,413	23,140	43,249	44,799	30,320	52,811

EXPORTS.

Plate - - - - - - - - -	6,485	9,063	12,404	9,150	13,712	20,806

over those of 1905 was due to the output of that country. This year, indeed, the figures for Belgium, so far, have fallen a little behind those for the first four months of 1906 as regards quantity, though the value is greater.

MISCELLANEOUS.

There is stated to be good prospect of considerable business in roofing supplies to Manchuria. There must of necessity be considerable building done in Dalny itself, and in the numerous other towns dominated by Japanese influence along the South Manchurian Railway, to accommodate the fast-increasing population and business enterprises; also the extensive improvements contemplated by the railway company will create a demand for roofing and other building equipment for the fitting-up of terminals and various stations. It is observed that on the buildings now in construction in Dalny Chinese tiles are not being employed for roofing, as formerly, the material being chiefly of tin, iron, or steel.

The Acting British Consul at Jerusalem (Mr. F. G. Freeman), in his report on the trade of Palestine for 1906, states that in consequence of the growth of the population by the continuous influx of Jewish immigrants from Russia and elsewhere, the importation of building materials—such as iron and steel girders for roofing, corrugated iron sheets, tiles, planks, and cement—is increasing considerably. A very marked change is coming over Jerusalem and other towns through the substitution of girders and tiles for the time-honoured domed roofing. There is thus, says the Consul, an opening of which German, French, and Belgian exporters have not been slow to avail themselves, and it ought to be worth the while of British exporters and steamship companies to arrange freights on the same scale as those obtaining between Hamburg or Antwerp and Jaffa. The through rates by the German railways and the "Deutsche Levant Linie" enable goods to be brought from the interior of Germany and placed on the Palestine market with little addition to the cost.

Builders' Notes.

Berlin Building Trade Strike.—A general lock-out, affecting 120,000 bricklayers and masons in Berlin, has taken place despite the efforts made by influential industrials and the magistracy to prevent the calamity. The main cause of the lock-out is the men's demand for an eight-hour day. In a few weeks the lock-out will affect another 100,000 men of affiliated trades. The men are stated to have funds amounting to 3,000,000 marks and to be prepared to fight to the bitter end. Many new buildings, including two monster hotels, have had to postpone the date of opening. It is anticipated that the lock-out will be of long duration, as the masters are determined to make the most of the situation and present a firm front to the ever-increasing demands of the workmen.

The building trades of Edinburgh are stated to be very depressed at the present time, one reason for which is offered in the considerable amount of emigration which has taken place. Last year it is stated that there were over 4,000 unlet houses and now the figure is placed at 6,000. On the other hand, at a meeting of the Executive of the Scottish Building Trades Federation held recently in Edinburgh, at which representatives were present from Aberdeen, Inverness, Edinburgh and other centres, reports on the state of trade throughout the country were given which showed that generally speaking there was a slight improvement, although the building trade was still very bad in the Kilmarnock district and in Paisley a dull time was being experienced.

The Labour Market

Board of Trade Returns for April.

Employment in the building trades in April, though still dull, showed a seasonal improvement, and was better than a year ago.

Returns from 825 firms, employing 59,148 workpeople at the end of April, showed an increase in the number employed of 2·4 per cent. as compared with March.

The following table summarises the returns :—

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Workmen.	Labourers.	Lads and Boys.	Total.
London	10,573	6,996	577	18,146
Northern Counties and Yorkshire ...	3,756	3,313	866	7,935
Lancashire and Cheshire	5,037	3,980	1,141	10,158
Midlands and Eastern Counties...	3,501	3,783	478	7,762
S. & S.W. Counties and Wales	3,906	2,258	688	6,906
England & Wales ...	26,827	20,330	3,750	50,907
Scotland	3,248	2,016	877	6,141
Ireland	994	996	110	2,100
United Kingdom ...	31,069	23,342	4,737	59,148

Employment was dull with most branches of the building trades, but, as usual at this time of year, it was good with painters, who frequently worked overtime. Compared with March there was a general improvement with carpenters and painters, and a slight improvement with plumbers, while in Scotland masons and plasterers reported a decline owing, in the case of plasterers, to the gradual completion of term work.

Compared with a year ago an improvement was reported by carpenters and plumbers, and a decline by slaters in England, and by masons and plasterers in Scotland.

The percentage of Trade Union carpenters and joiners in the United Kingdom unemployed at the end of April was 4·3 as compared with 5·6 in March and 5·4 a year ago, the improvement being common to all districts except London. The percentages of Trade Union plumbers unemployed for the same periods were 7·1, 7·8, and 9·0 respectively, employment being better than a year ago in nearly every district.

London.

Employment continued dull generally. With carpenters and joiners it was worse than a month ago and a year ago, Trade Union returns relating to carpenters and joiners in the London district showing that 7·6 per cent. were unemployed at the end of the month, against 5·5 per cent. in March and 6·5 per cent. in April, 1906. With plumbers there was an improvement in employment, the percentages being 9·3, 12·8, and 13·5 respectively. Bricklayers reported little change compared with March and a year ago. Painters were well employed, with overtime.

Northern Counties and Yorkshire.

Employment was dull generally (except with painters), but rather better than in March, and at Leeds a decided improvement was reported.

Lancashire and Cheshire.

Employment was moderate with carpenters and bricklayers, but dull with plumbers. At Manchester it was better on the whole than in March, and plasterers' labourers reported it as good.

Midland and Eastern Counties.

Employment was dull on the whole, but with bricklayers, masons, and painters at better than in March. At Coventry it was good. Plumbers at Birmingham and Leicester reported a decline in employment.

Southern and South-Western Counties and Wales.

Employment was better than in March. Plymouth and at Cardiff it was reported as fairly good. With carpenters and joiners it remained slack generally.

Scotland.

Employment continued dull with bricklayers and masons, fair with plasterers, and good with painters. With carpenters and plumbers it was moderate generally; with slaters fair. Many bricklayers and masons have left Edinburgh for other towns, while a number of carpenters have left Aberdeen. At Dundee employment was better than in March.

Ireland.

At Dublin carpenters and plasterers were well employed on the exhibition buildings; bricklayers and masons were slack. At Belfast employment was fair, except with bricklayers, who reported it as dull.

Changes in Rates of Wages.

The Board of Trade reports that the painters and decorators of Manchester received an advance of a farthing per hour —from $8\frac{3}{4}$d. to 9d.—from May 1st. The approximate number of persons affected by the increase is 1,010.

About 1,700 limestone quarrymen in Weardale received an advance of wages in April amounting to 5.1 per cent. on standard rates, making wages 36.75 per cent. above the standard of 1879.

LABOUR IN CANADA.

The "Emigration Gazette," published by the Salvation Army, recently gave two useful pieces of advice to craftsmen in the building trades who desire to emigrate to Canada. A plasterer who asked the best place to "strike" in Canada was informed that plastering was one of the many trades in which there was a great demand for men, and that a plasterer would get work in any fair-sized town. A few weeks ago a well-known contractor in Montreal was in need of 50 plasterers to whom he was offering 2s. 4d. per hour, but he could not secure half the number. Building operations are extending all through the country, and the coming year bids fair to beat all record. Either Montreal or Toronto, it was stated, would meet the correspondent's requirements. A stonemason inquiring as to his prospects in Winnipeg, where he was anxious to go, as he had friends there, was informed that this town was growing almost beyond itself. The building trade was booming, and plenty of stonemasons (or "stonecutters," as they are called there) were required. The pay is 65 cents or 2s. 4d. an hour.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen	8	—	8	8	8	8	8	4½–5
Accrington	9	9	8½	9	7½	8½	—	5½ 6
Ashton-under-Lyne	9½	10	9	10	8½	9	8½	5½–6½
Barnsley	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness	9	9	8¾	9	9	8¼	8¼	6–6½
Bath	7½	7½	7½	7½	7½	6½–7½	6½	5–5½
Belfast	8½	8½	8½	8½	8	8½	8½	19s. wk
Birkenhead	9½–10	9½	9½	9½	9	9½	8½	5½–6½
Birmingham	10	9½	9½	10	9	9½	8½	6½ 7
Blackburn	9½	10	9	9	9	9	8	6
Blackpool	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton	9½	10	9½	10	9	9	8½	6½–7
Bournemouth	8	8	8	8	8	8	7½	5½
Bradford	9	9	8½	8½	9	9	8	6–6½
Brighton	9	8	8	8	8	9	7	5½
Bristol	9	9	9	9	9	9	8½	6
Burnley	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury	9½	10	9½	9	9	9	8½	5–6½
Cambridge	8½	8	8	8½	8	8½	6½	5–5½
Cardiff	9	9	9	9	9	9	8½	5½
Carlisle	8½	8½	8	8	9	8	8	5–5½
Chatham	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie	9½	9½	9	9½	9	8½	9	6
Colchester	8	8	8	9	8	9	6 6½	5–5½
Cork	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3 5/9
Coventry	9	8¾	9	9	9	9	8	6
Crewe	8½	8	7	9	8	8	7	5–6
Darlington	9	9	8½	9–9½	9½	8	7½	6
Darwen	9½	9½	9	9	9	9	8¼	6
Derby	9	9	8½	9	9	8½	7½	5½–6
Dublin	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley	8½	8	8	8½	8	8	7	5–5½
Dundee	8½–9	10	9	8½	8½	9½	8½	5¼–5½
Eastbourne	8½	8	8	9	pce.	8	7½	5½
Edinburgh	8½	9½	9	9	—	9	—	5½
Exeter	8	8	7½	7½	7½	7½	6½	5
Glasgow	—	9½	10	9½	9	9	9	5½–6
Gloucester	7½	8	8	7½	7½	8	7½	5
Greenock	9½	10	9	9½	9½	9	9	5½
Grimsby	—	9	8	9	pce.	—	7½	6–7
Halifax	9	9	8¼	8½	8½	8	7½	6
Hartlepools	9½	9½	9¼	9½	—	—	—	6½–7
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield	9	9	8½	8½	9	7½ 8	7½–8	6
Hull	9¾	9	9	8	9	9	9	6½–8
Ipswich	8	8	8	9	9	8	6½	5–5½
Keighley	8½	8½	8	7½	8½	7½	7½	6
Lancaster	9½	10	8½	9	9	8	8½	5½–6
Leeds	9½	9½	9	9½	9	9	8	6½–7
Leicester	9	9	9	10	9	9	8	6½–7
Leigh	9½	9½	9½	9	8½	9	8	6–6½
Lincoln	8½	8	8	9	8	8	7	5–6
Liverpool	9½–10	9½	9½	9½	9½	9½	8½	5–6
London	10½	10½	10½	11	—	11	—	—
Londonderry	7	7	7	7	6½	7	7½	15s. wk.
Macclesfield	8	8	8	7¾	6½	7½	7½	5
Manchester	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	8½	9	8	6¼–6¾
Newcastle	9½	9½	9½	9½	9½	9	8½	6¼
Newport(Mon.	8½	8½	8½	8½	8½	8½	7½	5½
Northampton	8½	8½	8½	8½	—	8½	7½–8	5½
North Shields	9½	9½	9½	9½	9½	9	9	6¼ 6½
Norwich	8	8	8	8	8	8	6½	5
Nottingham	9½	9	9	10	9	9	8½	6½
Oldham	9½	10	9½	9	8½	9	8½	5½–7
Oxford	8½–9	8	8	8	8	9	7	5½
Paisley	9	9½	9	9½	9	9½	9	6
Perth	8	10	8	8	8	8	7½	5½
Plymouth	8	8	8	8	8	8	7	5
Portsmouth	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham	9½	9½	8½	8½	8	8½	7½	6
St. Helens	9	9	9	9	9	8½	8¼	5½–6
Scarborough	8½	8½	8	8½	33s. wk.	8	7½	6
Sheffield	9½	9½	9	9	9	9	7½	5½–6½
Southampton	8	8	8	8	pce.	8	7	5
Southport	9	9	8¾	9	9	9	8½	6
South Shields	9½	9½	9½	9	9½	8¾	8½	6¼
Stockport	9½	9½	9	10	9	9	8	6–7
Stockton-on-Tees	9	9½	8	8½	—	9	8	6¼–6½
Sunderland	9½	9½	9¼	9½	9½	37s. wk.	8½	6¼
Swansea	8½	—	8½	8½	—	8½	7½	5½
Torquay	7	7	7½	7	7	7	7	4½–5
Wakefield	9	8½	8	8½	8	7½	7½	6
Walsall	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington	8¾	9¼	9¼	9½	8½	9¼	8	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan	9½	10	9	9	8½	9	8½	5½–6½
Wlverhampton	9	9	9	8½	8	9	7½	6
Worcester	8½9¼	8½	8½	8½	8½	8½	7	5½
Yarmouth	7½	7½	7½	A	7½	7½	6	4–4

A. Done by bricklayer.

Current Market Prices.

FORAGE.

		£	s.	d.	£	s.	d.
Beans...	per qr.	1	11	0	1	13	0
Clover, best...	per load	4	7	0	4	7	6
Hay, good ...	do.	4	0	0	4	5	0
Sainfoin mixture ...	do.	4	0	0	4	7	6
Straw...	do.	1	8	0	1	14	0

METALS.

		£	s.	d.	£	s.	d.
Standard Copper ...	per ton	102	0	0	103	0	0
Do. Strong sheets ...	do.	120	0	0	121	0	0
Lead, soft foreign ...	do.	20	0	0	20	10	0
Do. English ...	do.	20	10	0	20	12	6
Do. pipes...	do.	23	12	6	23	15	0
Do. sheets ...	do.	23	0	0	23	5	0
Galvanised Corrugated sheets ...	do.	13	12	6	13	15	0
Spelter G. M. ...	do.	25	10	0	25	15	0
Angles, Scotland ...	do	7	5	0	7	7	6
Bars, do. ...	do.	8	0	0	8	2	6
Marked bars, Staffs. ...	dc	8	17	6	9	0	0
Common bars, do ...	do.	6	17	6	7	0	0
Angles, M'boro. ...	do.	7	0	0	7	2	6
Joists do. ...	do.	6	15	0	6	17	6
Angles, Midlands ...	do.	7	5	0	7	7	6
Joists do. ...	do.	7	5	0	7	7	6
Girder plates, Midlands ...	do.	8	0	0	8	2	6
Angles, Foreign, c.i.f. Thames	do.	7	3	6	7	5	0
Tees do. do. do.	do.	7	5	0	7	7	6
Joists, do. do. do.	do.	6	7	6	6	10	0
Channels do. do. do.	do.	6	10	0	6	12	6
Tin, Foreign ...	do.	190	0	0	191	0	0
Do. English ingots ...	do.	193	0	0	194	0	0
Zinc, sheets, Silesian, ...	do.	30	0	0	30	10	0
Do. do. V.M. ...	do.	30	10	0	31	0	0

MISCELLANEOUS.

		£	s.	d.	£	s.	d.
Bricks Stocks, d/d to job	per 1,000	1	17	0		—	
Do. Flettons on rail ...	do.	1	7	0		—	
Do. Pressed Wire Cuts, d/d to job ...	do.	2	0	0		—	
Do. Blue brindled wire cuts	do.	1	5	0		—	
Do. do. wire cuts ...	do.	1	9	0		—	
Do. do. pressed facings	do.	2	0	0		—	
Coke Breeze, into carts at gasworks ...	per load	0	2	0		—	
Do. d/d to job	do.	0	4	0		—	
Sand	per yard	0	7	6		—	
Ballast	do.	0	6	6		—	
Cement	per ton	1	13	0		—	
Lime	do.	1	4	0			
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds	per sq. ft.	0	0	3		—	
Do. do. do. do. 3rds.	do.	0	0	2		—	
Do. do. do. 21oz., 2nds.	do.	0	0	5		—	
Do. do. do. do. 3rds	do.	0	0	3		—	
Do. do. do. 26oz., 2nds	do.	0	0	6		—	
Do. do. do. do. 3rds	do.	0	0	4¼		—	
Do. do. do. 32oz., 2nds	do.	0	0	8		—	
Do. do. do do. 3rds	do.	0	0	6		—	
Do. English patent plain rolled plate in stock crates ⅛	do.	0	0	2		—	
Do. do. do. 3/16	do.	0	0	2¼		—	
Do. do. do. ¼	do.	0	0	2		—	
Granite Chippings ...	do.	0	10	6		—	
Do. do. ¾in. ...	do.	0	11	6		—	
Do. Broken, 1½in. ...	do.	0	15	6		—	
Do. do. 2in. ...	do.	0	15	0		—	
Do. do. 2½in. ...	do.	0	14	6		—	
Do. Kerb, Norwegian 6×12 and 12×6 in river	per foot	0	1	2		—	
Do. do. do. circular	do.	0	1	5		—	
Do. do. do. 12×8 in river	do.	0	1	5		—	
Do. do. do. circular	do.	0	1	8		—	
Do. do. Guernsey 6×12 in river	do.	0	1	4		—	
Do. do. do. circular	do.	0	1	6		—	
Do. do. do. Special, 4×6	do.	1	11	0		—	
Do. do. Guernsey, 3×6	do.	1	10	0		—	
Do. do. do. 3×7 & 3×9	do.	1	8	6		—	
Do. do. do. 3×5	do.	1	10	0		—	
Castor Oil, French ...	per cwt.	1	9	0		—	
Colza Oil, English ...	do.	1	13	6		—	
Copperas	per ton	2	0	0		—	
Lard Oil	per cwt.	2	15	0	2	17	0
Lead, white, ground, carbonate	per ton	16	0	0		—	
Do. red	do.	15	0	0	19	0	0
Linseed Oil, barrels ...	per cwt.	1	5	4½		—	
Petroleum, American ...	per gal.	0	0	6¾	0	0	6⅞
Do. Russian ...	do.	0	0	6¼	0	0	6⅜
Pitch	per barrel	0	10	0		—	
Shellac, orange	per cwt.	10	14	0		—	
Soda, crystals	per ton	3	2	6	3	5	0
Tallow, Town	per cwt.	1	13	0		—	
Tar, Stockholm	per barrel	1	5	0		—	
Turpentine	per cwt.	2	10	4½		—	

TIMBER.

		£	s.	d.	£	s.	d.
Deals, Archangel, White, 2nd, 3×9	per std.	9	10	0		—	
Do. Constanza, White, 3rd, 3×11	do.	8	15	0		—	
Do. do. do. do. 3×9	do.	9	0	0		—	
Do. Kungsgarden, Yellow & White, 3×9	do.	5	10	0		—	
Do. Langrör, Yellow, 3rd, 3×7	do.	11	0	0		—	
Do. do. do. 4th, 3×7	do.	10	0	0		—	
Do. Montreal, Spruce, 2nd, 3×9	do.	9	15	0		—	
Deals, Pine, 1st, 3×11	do.	21	0	0		—	
Do. Riga, Yellow, 1st & 2nd, 3×8	do.	8	0	0		—	
Do. do. do. do. 2½×7	do.	8	5	0		—	
Do. St. John, Spruce, 1st, 2nd & 3rd, 3×9	do.	8	15	0	9	0	0
Do. do. do. do. 3×7	do.	7	15	0		—	
Do. Skelleftea, Yellow, 1st, 2½×8	do.	9	10	0		—	
Battens, Altappen, Yellow, 2nd, 2×8	do.	9	15	0		—	
Do. Ingramport, Yellow, unsorted, 2×4	do.	7	5	0		—	
Do. Koivnsaari, Yellow, unsorted, 1×4	do.	8	10	0		—	
Do. Langrör, Yellow, unsorted, 2½×6	do.	9	5	0		—	
Do. Oscarsham, Yellow, unsorted, 2×4	do.	8	5	0	9	10	0
Do. St. Petersburg, Yellow, 3rd, 2½×6½	do.	8	10	0		—	
Do Skelleftea, Yellow, 1st, 2½×6	do.	9	0	0		—	
Do. do. do. do. 2×6	do.	9	10	0		—	
Do. do. do. do. 2×4½	do.	9	0	0		—	
Do. do. do. do. 2×4	do.	9	15	0		—	
Do. do. do. do. 2×3	do.	9	0	0		—	
Do. do. do., unsorted, 2×7	do.	9	10	0		—	
Do. do. do. do. 2×3	do.	9	0	0		—	
Do. Wasa (Wasklot), Yellow, unsort'd, 2×4	do.	9	10	0		—	
Do. do do. do. 2×3	do.	9	0	0		—	
Flooring Boards, Fredriksstad, White, 3rd, 1×7	do.	0	9	3		—	
Do. do. do. do. 1×6	do.	0	8	9		—	
Do. Yellow, do. 1×7	do.	0	10	6		—	
Do. do. unsorted 1×6	do.	0	10	0		—	
Do. do. Yellow and White, 1×7	do.	0	8	3		—	
Do. do. Mixed Yellow 1×6	do.	0	9	9		—	
Do Mon, Yellow, 1st, 1×6	do.	0	12	0			
Do. do do. do 2nd, 1×6	do.	0	11	0			
Do. Soderham, White, 1st & 2nd, 1×7	do.	0	10	0		—	
Do. do. do do. 1×6	do.	0	10	0		—	
Do. Sandarne, Yellow, 2nd, 1×6½	do.	0	11	0		—	
Do. do. do. do. 1×6	do.	0	11	0		—	
Do. Sundswell, Yellow, 1st, 1×5	do.	0	11	3		—	
Do. do. do. 2nd, 1×5	do.	0	9	9		—	
Do. do. do. 3rd, 1×5	do.	0	9	3		—	
Fir, Dantzic and Memel	per load	3	15	0	5	15	0
Pine, Quebec, Yellow ...	do	4	2	6	7	5	0
Do Pitch, American ...	do	3	17	0	6	5	0
Laths, log, Dantzic	per cu. fath.	4	0	0	6	0	0

HARD WOODS.

		£	s.	d.	£	s.	d.
Ash, Quebec	per load	4	5	0	7	10	0
Birch, New Brunswick ...	do.	2	12	6	5	5	0
Do. Quebec	do.	2	12	6	5	5	0
Cedar, Cuba	per ft. sup.	0	0	3¾	0	0	5
Do. Honduras	do.	0	0	3¾	0	0	5
Elm, Quebee	per load	4	2	0	9	5	0
Jarrah, planks	per ft. cu.	0	2	6	0	3	0
Mahogany, Average Price for Cargo, Honduras	per ft. sup.	0	0	5	0	0	6
Do. Cuba ...	do.	0	0	5	0	0	6
Do. African ...	do.	0	0	4	0	0	5½
Do. Lagos ...	do.	0	0	4	0	0	5½
Oak, Wainscot	per log	3	5	0	7	10	0
Teak, Indian, logs ...	per load	10	15	0	21	10	0
Do. do. planks ...	do.	14	5	0	22	10	0
Whitewood, American, logs	per ft. cu.	0	1	3	0	1	6
planks and boards ...	do.	0	1	6	0	3	9

Partnerships

Randolph & Holt, architects, Manchester (April 1).

Fairall & White, builders, Southsea (April 13). Debts by A. Fairall.

Balmforth & Ingham, general builders and contractors, Queensbury (Feb. 1).

Altham & Williams, joiners, builders and contractors, Clitheroe (June 30, 1904).

Bunn Brothers, builders, Norwich (March 27). Debts by George Bunn, who continues.

Turford & Southward, builders and merchants, Ludlow (April 6). Debts by E. Turford.

Morris & Mattock, builders and contractors, Cardiff (April 29). Debts by I. L. Mattock.

Moore & Bristow, brick and tile merchants, Bramall and Stockport (May 3). Debts by P. J. Bristow.

Myring & Son, builders and contractors, Ealing (Dec. 31, 1906). Debts by C. E. Myring and R. C. Platt, who continue.

S. B. Wilding & Sons, plumbers, painters and decorators, Preston (April 30). Debts by R. H. Wilding, who continues.

Joseph Fielding & Sons, builders and stonemasons, Blackpool (September 30, 1906). Debts by W. Fielding, who continues.

Hartley & Kemplay, builders and contractors, Shipley (March 16, by death of J. J. Hartley). Debts by G. W. Kemplay, who continues.

Holt & Dooley, builders and contractors, Sale and Northenden (Dec. 3, 1906). Debts by C. J. H. Gradisky, who continues as C. J. Holt & Co.

Harrison & Ward, architects and surveyors, London (Feb. 23). Business will be carried on by W. H. Harrison at 66, Victoria Street, and by M. S. Ward at 190, Victoria Street.

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

June 26, 1907.

CONTRACTORS' SUPPLEMENT (MONTHLY).

Vol. XXV. No. 646. 6, Great New Street, Fetter Lane, London, E.C.

INCIDENTS IN THE BUILDING TRADES OF LONDON IN THE XIVth AND XVth CENTURIES.

By W. Culling Gaze.

(Concluded from p. 42, Contractors' Supplement).

The Plumber's Ancestors.

On November 11th of the year 1350 the account of Robert le Fundour and William de St. Albans, keepers of the Conduit in Chepe, contained the following :—"The said masters also account for having expended :—for repairing the fountain-head, 33s. 6d.; spent another time, on examining the conduit, when it was slandered for poison, by command of the Mayor, 32s. 2d.; for bringing the pipe of the said conduit into the Mews (royal stables near Charing Cross, where the King's falcons were also "mewed" or confined), three men working for three days, each man receiving 8d. per day, 6s.; for ale given to them, 6d.; for mending the "spurgail" (probably stop-cock), which was broken at Flete Bridge, 6s. 3½d.; for mending the pipe there, 6s. 8½d.; for mending the "spurgail," which was broken between the mews and the mill in the field (on the site, probably, of Great Windmill Street, Haymarket), five men working four days, each man receiving 8d. per day, 6s. 8d.; paid them for drink, 5d. each day, 20d.; for cleansing and washing the fountain-head, twice each quarter, at 40d. each time, for the year, 26s. 8d.; for mending and covering the pipe at the fountain-head, in the high road, four men working for two days, each man receiving 6d., 4s.; paid them 4d. each day for drink, 8d.; for hire of a man and his cart for two days, at 2s. per day, 4s."

A Statement of Repairs.

In 1359 William Sunnyngge, a carpenter, submitted an account of moneys expended by him, as trustee, on the repairs of a house in the parish of St. Michael, Cornhulle (Cornhill), of which certain rooms had recently been destroyed by fire. The statement read thus :—"Paid to a tiler for two days' wages, for tiling the rooms of the said tenement, at 7d. per day, 14d.; for his man, the same time, 10d.; for their drink, 2d. Also, for 500 tiles, 4s.; for a cartload of sand, 4d.; for 6 sacks of lime, 12d.; for two small wedges, 12d.; for 2 plates for a gutter, 2s.; for 4 cartloads of stone for the pavement, 10s.; for 24 cartloads of gravel, 8s.; for paviers' work, 6s.; for timber and "ponchouns" (puncheons) to mend the walls, 3s. Also, for 1,500 lathes, 2s. 3½d.; for 1,500 "trasonnail" (treenails), 18d.; for 1500 "sprigges" (brads), 15d.; for nails, 4d. Also, for a carpenter's wages for two days, 14d.; for 12 cartloads of "lom" (loam), 4s.; for 9 sacks of lime, 18d.; for 3 cartloads of sand, 12d.; for one workman's wages for daubing, 9 days, at 7d. per day, 5s. 3d.; for his man the same time, at 5d. per day, 3s. 9d. Also, another time, for timber bought for repairing the rooms of the house, 12s.; for a carpenter's wages for four days, at 8½d. per day, 2s. 10d.; for soldering a gutter, 12d.; for candles used in doing it, one penny; paid a tiler and his man, for one day, 13½d.; for heightening a room of the said tenement, and for two engines hired for the same, for 2½ days, 2s.; paid three men for setting piles, and for ramming the same, 2s.; paid a carpenter for 2½ days, 20d.; paid two carpenters for 2½ days, at 7½d. per day, 3s. 1½d.; for their drink, the same time, 2d.; for 6 piles and 4 bases, 5s."

Royal Decree as to the Price of Tiles.

A severe tempest on January 8th, 1362, did much mischief in London—levelling as Thomas Walsingham stated, "high houses, lofty edifices, towers, and belfrys, trees, and other things, both hardy and durable, with the greatest violence." On March 28th King Edward III. issued a royal order from Westminster, which said :—"Whereas we have been given to understand that under pretext of the tempest of wind which has of late unhappily occurred in divers parts of our realm, by reason whereof many buildings have been levelled with the ground, and many dilapidated, broken, and damaged, and great multitudes of tiles and other coverings have been wholly or for the greater part torn from the roofs thereof; those who have tiles to sell, and other things suitable for roofing such houses, do sell the same, entirely at their own pleasure, at a much higher price than heretofore they were wont to do; and that the tilers and other roofers of buildings, seeing so great an urgency for persons of their calling, hesitate to follow their trade, or to do any work, unless they receive excessive wages for the same, and in like manner refuse, to the no small loss and grievance of our Commonwealth :—by reason thereof, by advice of our Council, we have ordered that tiles and other things requisite for the roofing of buildings shall be sold at the same price at which they used to be sold before the Feast of Our Lord's Nativity last past, and at no higher rate; and that tilers and their men, or assistants, and all other servants, artificers, and workmen. shall not take, or in any way presume to exact, for their daily labour, greater stipends or wages than before the said Feast they were wont to take; and that the makers of tiles and other things requisite for the roofing of buildings, shall make from day to day tiles and all other things for the roofing of buildings, and shall expose the same for public sale, when so made, as heretofore they used to do, without any withholding or concealing thereof. And we do entrust to you, and command you, that all and singular the matters aforesaid you will cause to be publicly proclaimed in the City, and in the said County of Middlesex, as well within the liberties as without, and will cause it on our behalf strictly to be forbidden, that any one shall do aught against the ordinance aforesaid, or dare to attempt to do, privily or openly, on pain of forfeiting unto us all things that he may forfeit; and all those who after our proclamation and prohibition aforesaid, shall be found doing to the contrary thereof, will take and imprison without delay, and their goods and chattels, as being forfeited unto us, will arrest, and under arrest detain, until we shall think proper to give other orders as to the same." A proclamation was thereupon made in the City, that tilers were to charge only 6d. per day, and their men 4d., on pain of imprisonment for a year and a day; and that the price of plain tiles was to be, at most, 7s. per thousand, and "holewe" (hollow) tiles, 7s. per hundred.

Regulations for Plumbers.

In the beginning of 1365 it was found necessary to regulate the trade of plumbers, and a Royal ordinance addressed to the Mayor, Recorder, and Aldermen of London, set forth :—

"That no one of the trade of plumbers shall meddle with works touching such trade within the said city, or take house or apprentices, or other workmen, in the same, if he be not made free of the city; and that, by assent of the best and most skilled men in the said trade, testifying that he knows how well and lawfully to work, and to do his work; that so, the said trade may not be scandalized, or the commonalty damaged and deceived, by folks who do not know their trade. That no one of the said trade shall take an apprentice for less than seven years; and that he shall have him enrolled within the first year, and at the end of his term shall make him take up his freedom, according to the usage of the said city. That every one of the trade shall do his work well and lawfully, and shall use lawful weights, as well in selling as in buying, without any deceit or evil intent against anyone; and that for working a clove of lead for gutters, or for roofs of houses, he shall only take one halfpenny; and for working a clove for furnaces, "tappetroghes" belfrys, and conduit pipes, one penny; and for the waste of a wey of lead when newly molton (he shall have an allowance), two cloves, as has been the usage heretofore. That no one for any singular profit shall engross lead coming to the said city for sale, to the damage of the commonalty; but that all persons of the said trade, as well poor as rich, who may wish, shall be partners therein, at their desire. And that no one, himself or by another, shall buy old lead that is on sale, or shall be, within the said city or without, to sell it again to the folks of the said trade, and enhance the price of lead, to the damage of all the commonalty. That no one of the said trade shall buy stripped lead of the assistants to tilers, "laggers" (layers of stone or the flat bricks then used), or masons, or of women who cannot find warranty for the same. And if anyone shall do so, himself or by his servants, or if any of them shall be found stealing lead, tin, or nails, in the place where he works, he shall be ousted from the said trade for ever, at the will and ordinance of the good folks of such trade. That no one of the said trade shall oust another from his work undertaken or begun, or shall take away his customers or his employers, to his damage, by enticement through carpenters, masons, tilers, or other persons; as he would answer for the damage so inflicted, by good consideration of the masters of the said trade. And if anyone shall be found guilty under any one of the articles aforesaid, let him pay to the Chamber of the Guildhall in London, for the first offence, 40 pence; for the second, half a mark; for the third, 20 shillings; and for the fourth, 10 pounds, or else forswear the trade."

Troubles with the Water-Pipes.

The system of water-pipes to the great conduit in Chepe came from Tyburn, by St. James's Hill (Constitution Hill), the Mews, near Charing Cross, the Strand, and Fleet Street. The pipes appear to have been partly above ground, and exposed to accidents and weather. In 1388, —"Seeing that very many losses and grievances had oftentimes befallen the people of Fletestret through inundations from the London aqueduct: which frequently, through the breaking of the pipes thereof, rotted and damaged their houses and cellars, and the party walls thereof, as also, their goods and wares, by the overflow therefrom, to the great damage of the persons dwelling in those parts; which evil might be removed and rectified by making a pent-house there, over the said aqueduct, as by many persons they were given to understand; therefore the good men of the neighbourhood aforesaid, on Saturday, the 12th day of June, came before Nicholas Extone, mayor, and the aldermen, and Richard Odiham, the Chamberlain of London, and entreated them that they might have some remedy devised for the same." Permission was given to erect a pent-house over the aqueduct, "opposite to the house and tavern there of John Walworthe, Vintner, which are situate near to the hotel of the Bishop of Salisbury" (on the site of Salisbury Court, Fleet Street). If this had not the effect intended, it was stipulated that the holders of surrounding lands and tenements should, when required, have "the said aqueduct and pavement to be closed and repaired, well and properly, at their own expense."

On July 14th, 1390, permission was given to the principal men of the "Ward of Farndone Within" to erect, at their own cost and charges, a "Water Conduit near to the Church of St. Michael le Quern, in the Westechepe of London, supplied by the great pipe of the Conduit opposite to St. Thomas of Acon—provided that the same work should not be injurious or harmful to the Great Conduit aforesaid." It was further stipulated "if at any future time that the pipes in the said Conduit, near to the Church of St. Michael, to be ordered, raised, and made, should be injurious or harmful to the Great Conduit, opposite to the Church of St. Thomas aforesaid, then the said pipes should be removed, and, at the expense of the persons aforesaid, the whole should be restored, the same as it was on the day of this license being obtained; and that the said pipes near to the Church of St. Michael aforesaid should then cease altogether to convey any water therefrom."

Regulations for the Smiths.

On September 22nd, 1394, the Mayor and aldermen passed an Ordinance for the regulation of the trade of blacksmiths in the city. Amongst the articles were the following:—

"Forasmuch as the folks of the said trade of Blacksmiths are oftentimes indicted at divers Wardmotes, from Ward to Ward, and warned to quit their houses, by reason of the great nuisance, noise, and alarm experienced in divers ways by the neighbours around their dwellings; it is ordained that from henceforth no one of the said trade shall work by night, but only from the beginning of daylight to 9 of the clock at night throughout all the year, except between the Feast of All Hallows (Nov. 1) and the Feast of Candlemas (Feb. 2); between which Feasts they shall work from 6 of the clock in the morning until 8 of the clock at night. And also, no one of the said trade shall work at all in his shop on any Saturday, or on the Eve of a Feast which is itself an Eve, after the first stroke of the bell rung for Vespers; on pain of paying, everyone of the trade who shall be found in default, and culpable as to the said points, the first time 40d., the second time 6s. 8d., and the third time 13s. 4d.

"That the masters for the time being of the said trade shall make their search within the franchise of the City, and in the suburbs thereof, for all manner of work of their trade, for retail in the hands of freemen of the trade; and shall bring all false work, and not marked, as being forfeited, to the Guildhall, to be adjudged upon by the Mayor, or by the Chamberlain; and that such loss by forfeiture shall fall as well upon him who has made false work as upon him who has made work and has not put his mark thereon.

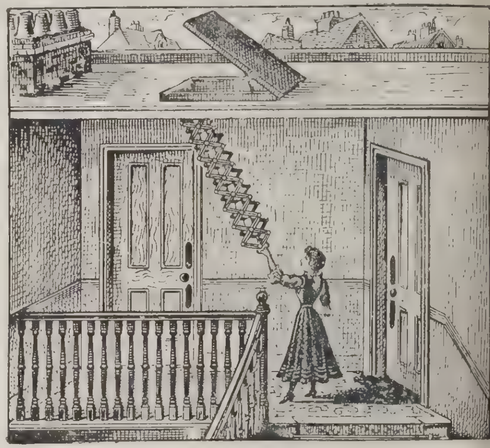
"That no manner of man following the said trade in the City, or in the suburb thereof, shall make any manner of key from any kind of impress thereof, unless he have the key itself present, or the lock to which the same key has to be made; by reason of the mischiefs which have happened, and which may happen in time to come. And whosoever shall be found from henceforth in default on this point, and shall be convicted thereof, he shall abide by the judgment and award of the Mayor and Aldermen thereon. That no man of the trade shall carry, or cause to be carried, any manner of work of the said trade to any fair, before that the said work shall have been shown to the Wardens for the time being of the trade, as being good and lawful to serve the people, on the pain above specified."

A new Baptist Church has been erected in Shepherd's Bush Road from designs (selected in competition) by Mr. Percival W. Hawkins, A.R.I.B.A., of Westminster. Mr. C. Gray, of Shepherd's Bush, was the contractor, and the Hathern Station Terra-Cotta Co., of Loughborough, executed the terra-cotta work which is a feature of the building.

Trade and Craft.

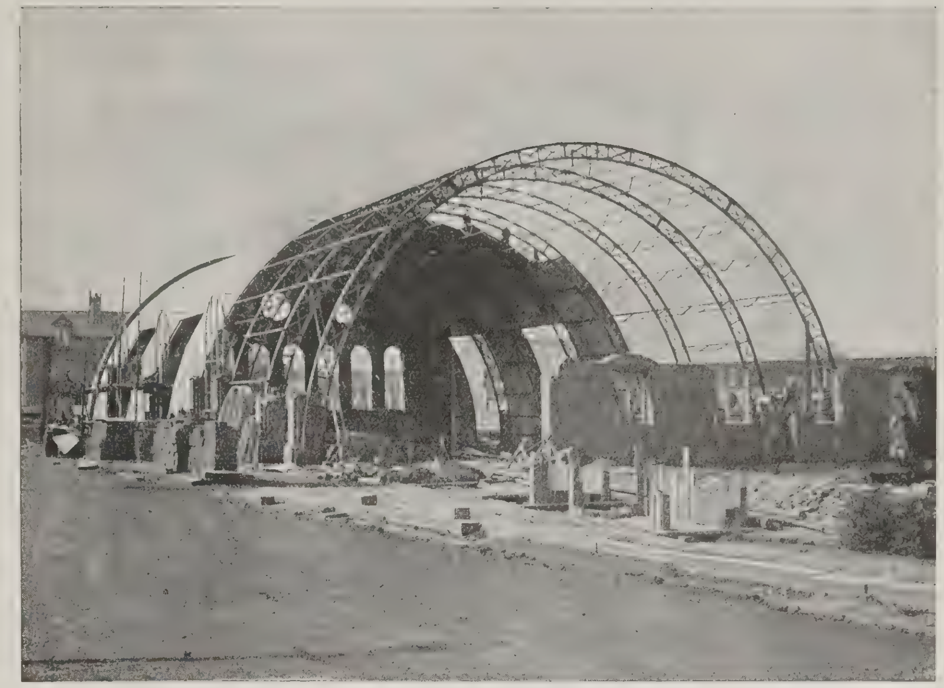
A Fire-Escape Ladder.

Under Section 12, (1) (B), par (*a*), the London Building Acts (Amendment) Act, 1905, which came into force in January last, provides for "a trap-door in a suitable position approved by the district surveyor, covered with copper or zinc, and hung on hinges so as to admit of the same opening to the fullest extent, and furnished with a counterweight so as to ensure that the same shall open automatically when unfastened, and also with a fixed or hinged step-ladder leading to the roof." The "Presto" combined ladder and trap has been invented to meet this requirement. The arrangement is shown by the accompanying view. The extensible ladder is constructed of stamped steel with steel bolts at the joints, and is amply strong enough to sustain heavy weights. It collapses right up into the space below the trap door. The ladder normally lies against the closed trap-door and is entirely out of the way. When a clip is released by means of a rope the ladder descends to the floor, opening the trap-door at the same time by means of levers. The counterpoise on the trap-door balances the descending ladder and prevents the descent being too rapid. When the trap-door is desired to be closed and the ladder placed up out of the way, the latter is simply pushed up by means of a hanging arm until secured by the clip. A hand-post for assisting persons to reach the roof is also fitted where desired; it is automatically raised when the trap-door is opened. The trap-door is secure against interference from the outside, becoming locked when the ladder is pushed up and fastened with the clip. The makers are the Presto Combined Ladder and Trap Co., 36, King's Road, St. Pancras, N.W.



Two Novelties.

Messrs. W. G. Crotch and Son, of Norwich, are the patentees of two new specialities which should meet with favour. The first is a new form of glass mosaic, at about half the cost of Venetian mosaic executed on the traditional method. It is claimed that Crotch's mosaic can be produced with all the richness of colour and varied brilliancy of gold that the older mosaic has, and that a gold mosaic can be manufactured which has a greater brilliancy than Venetian glass mosaic. Under their invention the glass is coloured in a permanent manner with enamels, and can be fixed in exposed positions externally, and will stand the smoke and fumes of a railway station, a periodical wash down with a sponge only being necessary to restore its brilliancy. Not only is it applicable to walls and ceilings, but also to floors. The second novelty is what is called "Reconstructed Stone." This is not an ordinary artificial stone, but is manufactured almost entirely from stone dust, without the aid of any cement. It therefore does not effloresce like ordinary artificial stone made with Portland cement. Messrs. Crotch and Son will guarantee that if the name of a quarry and a small sample of stone is forwarded to them for imitation, they will produce a piece of stone which is exact in texture and colour to the original. In each case they use the dust of the stone required. For instance, Bath stone dust and Portland stone dust for imitations of these two stones. Crotch's Reconstructed Stone does not contain any bedding or flaws, and consequently does not deteriorate by the action of wet or frost, and it can be produced with mouldings or other decorative details. Naturally the cost is much less than natural stone for an elaborately-carved elevation. Samples have been submitted to crushing tests and to absorption and freezing tests with excellent results. As regards the first-mentioned, three 4-in. cubes were submitted to Kircaldy, and gave a crushing strength of 185.7 tons per square foot.



DRILL HALL AND GUN SHED FOR 5th ROYAL GARRISON ARTILLERY, LANCASTER.
CONSTRUCTED BY E. F. BLAKELEY & CO.

Draught Prevention.

A patent draught preventer, known as "Durabar," has been invented by Mr. Arthur R. Groome, A.R.I.B.A., of Hereford. It effectually closes the gap or chink (whether great or small) under doors and French casements, preventing draught, dust, and weather leaks. The patent "Durabar" can be applied to both old and new doors, the doors of rooms, offices, &c., as well as entrance-doors, French casements, &c. The construction of the "Durabar" is simplicity itself. It has no springs or complicated mechanism to rust and break, or otherwise get out of order; has no stud or striking plate projecting out at its end to catch in and tear one's clothes; and is so neat as to be practically out of sight. The "Durabar" is easily fixed either upon or underneath the door, effectually closes the gap or chink by the mere act of shutting the door, and automatically, rapidly, and silently raises itself (by gravitation) so as to clear the floor carpet or other surface immediately the door is opened. There is therefore no rubbing or wearing of the carpet, &c., or of the draught-preventer itself. The "Durabar" is extremely durable, and will practicaly last a lifetime. The makers are the Draught, Dust, and Weather Excluder Co., of Palace Chambers, Hereford.

Waterproofing Walls and Roofs.

The Ruberoid Company, Ltd., of 81 83, Knightrider Street, London, E.C., have recently published two interesting catalogues regarding the use of "Ruberoid," for the covering of flat or sloping concrete roofs and the water-proofing of elevated water tanks. These catalogues have a number of interesting photographs, clearly showing the details of the method of laying "Ruberoid," and afford useful information which should be carefully studied, as the use of this material has now become so extensive that it may be considered ordinary building construction. Messrs. Ruberoid Co., Ltd., have recently placed on the market a special building or sheathing paper, or underslating, for damp walls and roofs, known as "Hercules Sheeting." This paper is impregnated with a waterproof compound such as is not found in any other building paper. It contains no tar, and will not deteriorate with age. It is especially serviceable in the treatment of damp walls. It is applied to the wall by means of Ruberoid solution, which in itself is a preventive of damp. The manufacturers claim that "Hercules Sheeting" is not only waterproof, but moisture-proof, and that no damp or moisture can possibly pass it. It is supplied in rolls 36ins. wide, containing 112 square yards. A sample yard will be sent on aplication. This firm recently issued a pair of very accurately-cut celluloid set squares, that are unobtrusive as regards advertising the firm's specialities. We referred some time ago to the advisability of firms issuing useful articles rather than the usual calendars and circulars, and these set squares are an admirable case in point. The Ruberold Co. will be pleased to send a set of these squares to any *bonâ-fide* architect or builder who may apply for them.

Heating and Hot Water Supply.

Milne's patent "Duplex" boilers, and a distinct system of hot water heating and hot water supply which is obtained by their use, are worthy of the attention of architects and others who may have heating systems to instal. The "Duplex" boiler has been made with the endeavour of overcoming the trouble arising from the deposit or incrustation in boiler and pipes which is so prevalent in London and the South. The novelty in this apparatus is that one boiler works two systems, *i.e.*, the water heated for domestic purposes does not mix with that used for the radiators or coils of pipes for warming rooms, halls, &c. It is not necessary that heating apparatus be attached—the boilers are fixed to provide domestic hot water service only. The water for domestic uses does not come in contact with an iron boiler, therefore no discolouration of water occurs. It is claimed that in no case wherever properly fixed has any trouble arisen from deposit in these "Duplex" boilers, many boilers having been specially opened after three or four years' working and the waterways being found quite clear. The furnace burns slack coal, and is provided with a fuel-feed hopper, which only requires replenishing three or four times in the 24 hours. The boilers are made by Mr. Edward P. Milne, of 15, Craven Street, Strand, W.C.

Constructional Steelwork.

The increasing adoption of steelwork in the construction of modern buildings lends special interest to a new catalogue that has just been issued by Messrs. E. F. Blakeley & Co., of Vauxhall Ironworks, Liverpool. This catalogue contains a large number of illustrations of several classes of buildings and should prove useful for reference. We notice that in Messrs. Blakeley's work there is often a general similarity in the form of roof trusses, this obviously resulting from the firm's adoption of standardisation. Standard stanchions are also adopted. This policy, the firm assures us, secures efficiency on best methods, economic production and expedition in delivery. It is of course usual for engineers of large steel-frame buildings to standardise details of stanchions and it is valuable to know that a large firm of structural engineers has found the principle can be extended with advantage to a miscellaneous practice. The catalogue includes drawings of various standard roof trusses. Messrs. Blakeley have, however, carried out numerous examples of roofs of special form; for instance, the fine roof we illustrate on this page, which covers the volunteers' drill hall at Lancaster. This roof is of 74ft. 8ins. span and 146ft. long. Messrs. Blakeley have designed and erected a goodly number of steel-frame buildings, and their works are of large extent, up-to-date and containing the latest machinery, "high speeds," and labour-saving appliances.

The Month's Trade

(**Reports by our Special Correspondents.**)

THE CLAYWORKING INDUSTRY.

The brick and tile trades do not seem to be progressing just at present, though they are not going back. The season is not exactly propitious, but the prospects are good and we hope shortly to be able to report that they are again going ahead. The building trades are still waiting for the great stimulus that cannot long be delayed as a result of the boom in the engineering trades and cotton industry.

During the past month employment was slack at Peterborough, Sheffield, Ruabon, Wrexham, and at Nottingham, where short time was general. It was also dull at Bristol and in Devonshire and Shropshire. At Birmingham, Stourbridge, Ipswich, and in the South Staffordshire and Tess and Hartlepool districts employment continued fair. It was good at Oldham, and in South Wales and Monmouthshire.

Plans are on foot for the organisation of a Japanese enterprise called the Manchuria Joint Stock Brick Manufacturing Company, with a capital of £100,000. The company's plant will be located at Shoushuiton, in the Kwangtung Leased Territory. Six other companies with a smaller amount of capital also intend to engage in this industry. In view of the large amount of construction that will be undertaken in the future in Manchuria, both in connection with the railways and in the many cities newly opened to foreign residence and trade, this enterprise should be a very profitable one.

THE STONE, MARBLE, GRANITE, AND SLATE TRADES.

The stone trades seem to be fairly well employed on the whole, and by no means in the depressed condition that the clayworking industry is. Many of the quarries are busy and orders are not slow in coming forward.

During the past month employment continued good in the limestone quarries in Weardale and in South Durham. Employment was fair in the Buxton and Plymouth districts and in North Wales. In the Somerset blue lias quarries employment was dull.

In the Bath stone quarries employment in the past month was slack, but slightly better than in the previous month. It continued dull in the Gloucestershire pennant stone quarries. Employment was fair and rather better than in the previous month in the Gateshead district and in the quarries in the Rowsley district of Derbyshire. In Forfarshire employment in the quarries remained dull.

In the Clee Hill road-material quarries employment was good and better than in the previous month.

Employment in the sett-making quarries was fair and better than in the previous month in Aberdeenshire. There was also an improvement at Glasgow, where employment was good. It was fair at Edinburgh and at Airdrie. In North Wales and Leicestershire employment, on the whole, was moderate. Employment was good and better than a month ago in the Clee Hill district. At Rowley Regis it was fairly good.

As regards the granite quarries, employment was fairly good in Aberdeenshire, and better than a month ago. It was moderate in Leicestershire. In Devonshire and Cornwall it was generally dull, and worse than last month.

Employment in the slate quarries continued slack in the North Wales quarries, and was reported as rather worse than a year ago in the Festiniog district. It continued fair at Ballachulish (Argyllshire).

In a report by H.M. Minister at Christiania on the mining industry of Norway it is stated that soapstone is found in several places, and, owing to its heat-retaining properties, is beginning to be used for making stoves, &c., as it is easily worked. Practically the whole of the Cathedral at Trondhjem is built of soapstone. Roofing slates are produced in Valdres and Gudbransdalen. Granite is exported in large quantities. Whetstones are quarried in Telemarken, and hewn stone, syenite and porphyry are also produced. Limestone is found near Christiania and elsewhere, and rich strata of marble, white, blue-white, or grey-white, is found in Nordland, near Fauske. The export is mostly to Denmark. The layers at Fauske are said to be 600ft. thick, and can be followed for 10 miles. The output is therefore only dependent on the demand.

The returns for imports of stones, slabs and marble, rough, hewn and manufactured, for the month of May, 1907, as compared with the same month in 1905 and 1906, are as follows :—

Tons.			Value.		
1905.	1906.	1907.	1905.	1906.	1907.
108,409	129,494	114,028	£108.897	£134,615	£122,657

THE PORTLAND CEMENT TRADE.

The position of the Portland cement trade continues very much as it was when we last reported. The home demand is without any material improvement, but on the other hand export business continues exceedingly active. The building and contracting trades have taken less cement than was anticipated, doubtless owing to the unfavourable weather that we have recently experienced, so that with more settled weather conditions some improvement in the demand in this quarter may be expected. It is interesting to note that in the recent report of the Reinforced Concrete Committee of the Royal Institute of British Architects it is urged that Portland cement for reinforced concrete work should not only comply with the British Engineering Standards Committee specification but it should be delivered on the work in bags or barrels bearing the maker's name. The object of this recommendation is obvious, and has doubtless been prompted by the knowledge that cheap natural foreign cement is still being imported into this country, and the use of it in work of this class would simply mean courting disaster and thus bring discredit on the industry. The Engineering Standards Committee also in their revised specification have inserted a clause to the effect that cement manufactured to the specification shall be sold and delivered in sacks bearing the maker's name, so that in future contractors and builders when ordering cement to this specification will require to see that this clause, which has been inserted for their own protection, is complied with. An examination of the new specification will show that it has been made more stringent than the one previously in use, and this will, of course, tend to a further improvement in the quality of the product.

The British Standard Specification for Portland Cement (Report No. 12) has worked exceedingly well since its issue, but suggestions have from time to time been brought to the notice of the Engineering Standards Committee whereby its usefulness might be extended, and to this end the present revisions are directed. The following may be mentioned among the more important points in which revisions have taken place :—

(1) The cement must now be delivered in packages marked with the manufacturer's name.

(2) The percentages of sulphuric anhydride has been slightly raised—namely, 2·75 instead of 2·5.

(3) The quantity of cement to be used in the test for fineness and the period for which it is to be sifted have been specified, while the residue to be left on a sieve 180 by 180 has been somewhat reduced. The quantity specified is 100 grammes of cement continuously sifted for a period of 15 minutes. The residue was formerly 22½ per cent., but is now put at 18 per cent.

(4) The grading for the increase of tensile strength in the neat test has been further extended—*i.e.*, the increase from 7 to 28 days must be not less than 10 per cent. when the 7-day test falls between 550lbs. to 600lbs. and 5 per cent. when it is 600lbs or upwards.

(5) The maximum final setting time for the "slow-setting" cement has been increased — namely, seven hours instead of five.

(6) The expansion under the Le Chatelier test has been reduced—namely, 10 instead of 12 millimetres after 24 hours, and 5 instead of 6 millimetres after 7 days duration.

Other alterations have been made in the direction of rendering the meaning of the specification more clear, such as, for instance, the insertion of an example showing the method of calculating in chemical equivalents the proportion of lime to silica and alumina. The design of the Standard needle (Plate 2) has been slightly modified with a view of diminishing the risk of injury, and to allow of the ready replacement of the point if damaged, but no alteration in the essential features has been made. The Sectional Committee have had under consideration for some time past the question of making some stipulation as to initial setting time, and experiments have been and are being carried out with a view to the inclusion of a clause dealing with this point. The Committee are also making certain other investigations, the desirability of which has been brought to their notice, but they have decided not to hold back the issue of the present revision pending the completion of these experiments, which are likely to occupy some considerable time. Copies of the Report, price 2s. 6d., or post free 2s. 8d., can be obtained from the publishers, Messrs. Crosby Lockwood & Son, or from the Offices of the Committee.

The report for 1906 of H.M. Consul-General at New York (Sir Percy Sanderson, K.C.M.G.) states that the importation of cement at New York showed a slight recovery, although the total amount involved was small and far below the average for the past five years. There was, however, a large increase in the import of this article into the United States as a whole, and, while Germany and Belgium still furnish the largest proportion, the trade from the United Kingdom shows the greatest advance during the year. Prices ruled higher in 1906 and there was a greater demand for building purposes. The total production of all kinds of hydraulic cement in 1906, including Portland, natural rock, and Puzzolan cements, is estimated at 50,027,321 barrels, valued at £10,803,330, as compared with 40,894,308 barrels, valued at £7,202,500, in 1905. The classes are distributed as follows:—45,610,822 barrels Portland, value £10,248,150; 3,935,275 barrels natural rock, value £472,430, and 481,224 barrels Puzzolan, value £82,750. The imports in 1906 amounted to 36,787,000lbs. (about 90,000 barrels), valued at £23,000.

The returns of England's imports and exports of cement for building and engineering purposes for May, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.

	1905.	1906.	1907.
Tons -	- 24,872	19,040	10,217
Value	- £32,312	£24,380	£13,765

EXPORTS.

	1905.	1906.	1907.
Tons -	- 48,945	56,345	72,561
Value	- £79,373	£83,550	£119,237

THE IRON AND STEEL TRADES.

Speculative influences have again depressed the price of pig-iron all during the past month. The fluctuation has been considerable in the public markets, but it has not affected makers, for the public stocks have continued to rapidly decrease, and the demand looks like continuing to boom for some time to come. Makers are well supplied with orders, and the strong position of the market must result in their being able to obtain still higher prices than they have been getting. It is rather surprising that there should be so much effect from speculation in warrants, for the public stores stocks are now getting low, totalling at the present time about 300,000 tons, whereas this time last year they amounted to about 720,000 tons. It can be seen from this that the demands upon their stocks have been remarkably heavy during the past year. This has been largely due to foreign demand, particularly the United States. The latter is still in need of pig-iron, and exports continue, while Germany is also taking a good share.

The intrinsic strength of the pig-iron market has resulted in a steady if somewhat slow rise in prices of manufactured iron and steel. This has also been helped by the increased cost of fuel. But it has now to be recorded that the demand seems to be increasing also. This is chiefly noticeable in the ship-building industry, and, unfortunately, we are not able to see any improvement in the demand for steel from the building trades. The price of structural steel, however, is dependent upon the demand from the shipbuilding and other trades and has advanced of late. Makers seem now to be better supplied with orders. There was a tendency a few months ago for buyers to hold back in the hope of prices falling, but the rise has brought them forward, and all is well.

At Middlesbrough, although there is far too much speculation, the condition of trade in the pig-iron market is excellent. There is no stock of East Coast hæmatite pig-iron and prices are at a high level, while in Cleveland pig-iron the stock in the public stores continues to diminish, being now well below 300,000 tons for the first time since March, 1905. Finished iron and steel in the same district continues to experience an improved demand. The export trade is active. Prices remain steady, however.

In Lancashire the market for pig-iron is in a strong position, while in manufactured iron and steel business is steady if not subject to much improvement.

In South Staffordshire the market for both pig-iron and manufactured iron and steel is without much movement.

In Scotland the makers of pig-iron are well supplied with orders and can maintain prices. Finished iron and steel is in good demand, export being heavy.

OTHER METALS.

The copper market is more steady now. Prices are not at such an abnormally high level. Stocks continue to decrease, but this may be due to the United States holding back material. The demand is active and therefore prices may easily go up again.

The tin market continues to boom. Stocks are lower than last month and the demand continues to exceed the supply.

Lead is inactive.

The return for imports and exports in certain branches of the iron and steel trades for the month of May, 1907, as compared with the same month in 1905 and 1906, are as follows:—

	Imports.			Exports.		
	1905.	1906.	1907.	1905.	1906.	1907.
Pig and Puddled Iron ... ... tons	12,768	9,788	5,148	88,059	148,637	191,536
Wrought iron, in bars, angles, rods and sections	8,521	8,951	5,536	13,432	14,190	16,699
Rails	4,969	1.621	572	48,601	30,719	30,060
Girders, beams, joists and pillars from Belgium	7,790	10,629	3,935	6,780	8,873	9,071
" " " other countries	1,761	4,679	3,202			
Steel Ingots, blooms billets, slabs, sheet bars, tin plate bars, similar partly manufactured	42,012	50,454	30,641	707	1,108	3,900
Steel Bars, angles, rods and shapes or sections	4,321	5,291	1,548	14,903	18,706	23,514
Galvanized sheets (flat or corrugated)	—	—	—	35,418	34,628	41.295

THE IRONMONGERY TRADES.

Employment in the lock and latch trades at Wolverhampton and Willenhall continued bad in the past month. At Wolverhampton employment in the hollow-ware trade was good. It continued quiet with hollow-ware makers at West Bromwich; slack with hollow-ware stampers and buffers at Sheffield.

In the stoves, grates, &c., trades employment has been quiet at Rotherham and Leeds; fair at Falkirk and Glasgow.

At Birmingham employment has been fairly good with nut and bolt makers; good with wire nail and shoe rivet makers. At Darlaston it has been good with nut and bolt makers. At Blackheath it has been good with bolt, rivet, &c., makers.

Employment with wireworkers continued good generally.

The returns for imports and exports for May, 1907, as compared with the same month in 1905 and 1906 are as follows:—

IMPORTS.	Tons.			Value.		
	1905	1906.	1907.	1905	1906.	1907.
Wire nails	2,890	4,131	3,040	£28,697	£40,835	£31,866
Nails (other than wire nails), screws and rivets ...	1 036	865	424	17,320	13,903	7,418
Bolts and nuts	335	337	349	5,337	5,191	6,516
EXPORTS.						
Nails, screws and rivets...	2,227	2,465	2,435	42,299	44,931	46,897
Bolts and nuts	1,473	1,810	2,281	25,162	34,140	42,227

THE GLASS TRADES.

Employment in the past month with sheet glass makers and flatteners at St. Helens has continued good. Employment has also been good with London glass-blowers. It has been fair with plate-glass bevellers at Birmingham.

A large factory for the manufacture of glass, plate glass, tiles and mirrors has been erected at Arija, in the Province of Burgos, Spain, by a company domiciled in Bilbao, named "La Cristaleria Española." The first trials were carried out in May, and the present month will see work started on a large scale. The company have acquired 75 hectares (about 187 acres) of ground containing large supplies of an excellent and fine sand suitable for the making of the various products they propose manufacturing. The works cover an area of five hectares (12½ acres) and some 400 men are at present employed. These works are provided with three large ovens, the latest machinery, including polishing tables for plate glass admitting up to 120ft. in length by 42ft. wide, and an electric transporter to lift 10 tons. Thirty cylinders are installed for the engraving of glass in colours. A small river traverses the company's property, and dams are built to insure a constant supply of water. Gas and electric works have been erected with a dynamo of 700 h.p. The railway company (Luchana to La Robla) have built a station adjoining the works, and the new enterprise promises a large volume of traffic for the railway. About 40 tons of coal per day will be required, and the carriage of the factory's production, which is calculated to amount to many thousand cubic metres per annum, will also go to that line.

The returns for imports and exports of glass for the month of May, 1907, as compared with the same month in 1905 and 1906, are as follows:—

IMPORTS.	Cwts.			Value.		
	1905.	1906.	1907.	1905.	1905.	1907.
Window and German Sheet, including shades and cylinders	83,035	126,200	104,859	£50,908	£70,692	£58,562
Plate	34,829	30,498	38,674	42,839	38,701	46,486
EXPORTS.						
Plate	11,586	14,504	14,281	15.009	19,242	24,686

THE PAINT TRADES.

The paint trades continue fairly well employed. As regards materials, the returns for imports and exports for May, 1907, as compared with the same month in 1905 and 1906, are as follows:—

		Quantity.			Value.		
		1905.	1906.	1907.	1905.	1906.	1907.
IMPORTS.							
White lead	Cwts.	25,334	25,068	23,564	£20,588	£22,491	£23,461
Zinc oxide	...	25,273	23,211	22,692	25,504	26,144	26,761
Other colours and pigments	...	131,276	131,855	188,685	84,846	84,081	100,322
Turpentine	...	21,841	12,830	18,418	40,980	20,622	33,979
Lac-dye, seedlac, shellac and sticklac	...	6,526	9,805	10,575	46,518	90,855	100,914
Linseed oil	Tons	1,052	1,411	282	19,689	30,323	6,512
EXPORTS.							
White lead	Cwts.	35,600	38,277	42,356	33,824	40,559	50,888
Zinc oxide	...	4,609	7,513	7,124	5,765	7,953	9,024
Other colours and pigments	...	132,489	143,282	141,625	167,681	178,724	180,953
Linseed oil	Tons	3,155	2,136	2,301	58,926	46,747	58,247

At the instance of the White Lead Section of the London Chamber of Commerce Blundell, Spence & Co., Limited, Hull, were summoned before the Hereford magistrates last week for applying to four tins, purporting to contain white lead, the false description "White lead," and also for selling it as such. It appeared that Messrs. Woollard, Limited, Hereford, had a contract to supply the Hereford Guardians with white lead, and ordered from the defendants four 28-lb. tins, two of which were supplied to the workhouse. The master opened one, and receiving circulars from the White Lead Section sent a sample for analysis. It was found to be adulterated with 30 per cent. of barytes, which cost only 3s. a hundredweight, against 25s. for white lead. Messrs. Woollard were threatened with prosecution under the Merchandise Marks Act unless they gave up the name of the real person responsible. This they did. For the defence witnesses were called to show that the trade custom was to regard white lead as containing genuine white lead and oil, and the white lead numbered 1, 2, 3, or 4, as admixtures of white lead and barytes. The Bench decided to convict, considering that the description of white lead number 2 came within the meaning of the Act as a false description, the admixture of barytes not being white lead; but they fully acquitted the defendants of any intention to defraud. The fine on the first summons was fixed at £10 with a hundred guineas costs. The other summons was adjourned *sine die* pending the appeal.

THE WALLPAPER TRADE.

The following is the return of paper-hangings issued by the Board of Trade for May, 1907, as compared with the same month in 1905 and 1906:—

	1905.	1906.	1907.
IMPORTS.			
Cwts.-	- 4,733	6,637	5,714
Value	- £13,006	£17,389	£14,842
EXPORTS.			
Cwts.-	- 7,109	7,839	8,444
Value	- £16,607	£18,456	£17,863

The wallpaper trade still exhibits signs of prosperity. The importation and exportation of wallpaper continue heavier than in 1906 or 1905. We have in previous months shown the percentage increase in both directions and we now present the figures for the first five months of this year as compared with the same period in the two previous years. The value of the importation of paper-hangings in the first five months of 1907 has been 1·2 per cent. better than in 1906, and 28·1 per cent better than in 1905. The exportation shows 3·4 per cent. increase on the first five months of 1906 and is 5·8 per cent. better than for the same period of 1905. Apparently from this the foreign manufacturer is being kept well in check by the English combine.

A NORTHERN BUILDING TRADES EXCHANGE.

An important alteration was made early this month in the rules of the Building Trades Exchange of the city and district of Glasgow at an extraordinary general meeting in the offices of the company in Hope Street. Proposed new rules were read by Mr. David Cook, the secretary, providing for the representation on the Council of the Institute of Architects, the Institute of Measurers, the Master Masons' Association, the Master Bricklayers' Association, the Master Wrights' Association, the Master Slaters' Association, the Master Plumbers' Association, the Master Plasterers' Association, the Master Lath-splitters' Association, the Master Glaziers' Association, and the Master Painters' Association.

In moving the adoption of the new rules, the President (ex-Deacon-Convener Goldie) said the Building Trades Exchange had now been in existence for 13 years, and the change was dictated by experience. The constitution, originally framed on what was known of several flourishing building exchanges in America and elsewhere, required alteration to meet the somewhat different circumstances which prevailed in the West of Scotland.

One great difference in their method of carrying on business in the West of Scotland lay in the fact that, so far as the building trades were concerned, the single contractor had never caught on. The practice of each department of trade contracting direct with the proprietor was of so long standing and worked so well for the individual trades, and seemingly for the architects, that the system might be looked upon as a permanent one.

Each department had at present a well-organised association competent to deal with every phase of its individual trade, each association complete in itself and requiring no assistance from the outside for the conduct of its own particular branch. That being so, it was left for the Building Trades Exchange to deal with the larger questions involved in the building trade, and it was with the view of broadening out their basis and dealing with a larger sphere that they now proposed to ask all these associations to become in a manner affiliated with the Exchange.

There were many things in which, if the various associations were to meet together in one sort of Upper House, they could be of immense service to each other and deal with larger questions in a manner that it would be impossible to do separately.

If the proposals were agreed to, and the alteration successfully carried through, there was, he believed, a great future before the Building Exchange.

The motion was carried unanimously.

Builders' Notes.

The Report of Spencer Santo and Company the well-known contractors, for 1906, states that though the building trade has not yet shown the improvement hoped for, the company were successful in obtaining various contracts which have proved remunerative, though the margin of profit has been necessarily lower than in more prosperous times. The total receipts amount to £18,500, as compared £15,500, as against £23,000. For 1905 the distribution on the Ordinary capital was 10 per cent., the same as for the three preceding years, but this time only 6 per cent. is paid, the directors, instead of declaring a higher dividend, preferring to strengthen the reserve fund by an addition of £5,000.

The Report of J. G. White and Co., Limited, for the year to February 28th states that the profit is £38,378, showing a steady improvement on previous years' results. The business has continued to show considerable development in the foreign field, and the company is now actively carrying out works in Buenos Ayres, Montevideo, Para (Brazil), Caracas (Venezuela) and Bombay. Very little business is offering in Great Britain, but the directors hope, with the present outlook for foreign business and the continued development and widening of the scope of the company's legitimate fields of operation, to offset any diminution in volume of British contracting business. The total contract value of work which the company has in hand at the date of this report, exclusive of work on which profits have been taken at February 28th, is in excess of £1,500,000. The available balance to the credit of profit and loss account is £47,811. This amount the directors recommend should be dealt with as follows:—In payment of a dividend free of tax at the rate of 6 per cent. per annum on the Cumulative Preference shares for the half-year to February 28th, £4,500; in payment of a dividend free of tax at the rate of 6 per cent. per annum on the Ordinary shares for the year, £3,000; in payment of a bonus of 1 per cent. on the full amount of the Preference and Ordinary share capital, £2,000; to reserve, £20,000; to be carried forward to next year's accounts, £18,311.

By-products from Fir Wood.—According to the *Pacific Lumber Trade Journal,* of Seattle, U.S.A., the problem of successfully extracting valuable by-products from Douglas fir has apparently been solved by a Puget Sound Company. From a cord of stumps or of wind shake wood the company has obtained turpentine, wood spirits, tar, pyroligneous acid, and chemically pure charcoal, having an aggregate commercial value of 28.60 dols., while the outside cost of production is but 12 dols. per cord. The test was made with a cord of ordinary fir wood. The first treatment consisted of passing superheated steam through the chipped wood to obtain the basis for the turpentine. The chips, after this process, were placed in a fire retort and reduced to charcoal, the other products passing off in the form of gas, which, being condensed, furnished the basis for the tar and cresoting materials. The two liquids thus obtained were distilled, and the following final products obtained as a result of the test with one cord of wood:—7·85 gallons of pure turpentine; 17·14 gallons of second grade turpentine, or wood spirits; 88 gallons of high grade tar; 138·86 gallons of pyroligneous acid; 880 pounds, 55 bushels, of chemically pure charcooal.

Bankruptcies.

DURING THE WEEK ending June 21st twenty-two failures in the building and timber trades in England and Wales were gazetted.

C. NORTH, builder, Stratford. Adj., June 13.

J. T. ALLEN, plumber, Leicester. Adj., June 12.

F. WOOD & Co., builders, Luton. R.O., June 13

C. RICKATSON, builder, Handsworth. Deficiency, £1,145.

H. A. BODIEN, builder, London, W.C. Adj., June 12.

G. F. PANTHER, builder, Hounslow. R.O., June 14.

E. H. COULT (trading as E. Coulter), builder, Streatham Common. Adj., June 13.

E. JONES, builder, Cardiff. First meeting, O.R.'s, Cardiff, June 26, at 12. P.E., Cardiff Law Courts, July 2, at 11.

J. R. ANDREWS, joiner and builder, Starbeck. R.O., June 10. P.E., Courts of Justice, York, July 12, at 11.

G. MALTBY, builder, Hull. R.O., June 12. First meeting, O.R.'s, Hull, June 26, at 3. P.E., Hull C.C., July 15, at 2.

G. J. PICKUP, joiner, Accrington. First meeting, O.R.'s, Preston, June 26, at 11. P.E., Blackburn C.C., July 3, at 9.45.

H. C. BRICE, joiner, Hull. R.O., June 10. First meeting, O.R.'s, Hull, June 10, at 11.30. P.E., Hull C.C., July 15, at 2.

The Labour Market

THE BOARD OF TRADE RETURNS FOR MAY.

Employment in May continued dull, and showed little change compared with April and a year ago.

Returns from 839 firms employing 56,217 workpeople at the end of May showed a decrease in the number employed of 1·0 per cent. as compared with April.

The following table summarises the returns for May :—

District.	Number of Workpeople paid Wages on the last pay-day of the month.			
	Skilled Workmen.	Labourers.	Lads and Boys.	Total.
London	11,383	7,449	675	19,507
Northern Counties and Yorkshire ...	3,422	3,033	769	7,224
Lancashire and Cheshire	4,679	3,555	1,048	9,282
Midlands and Eastern Counties...	2,615	2,026	399	5,040
S. & S.W. Counties and Wales	3,833	2,513	662	7,008
England & Wales ...	25,932	18,576	3,553	48,061
Scotland	3,330	2,064	837	6,231
Ireland	905	929	91	1,925
United Kingdom ...	30,167	21,569	4,481	56,217

Employment remained dull with most branches of the building trades, but continued good with painters, who frequently worked overtime. Compared with April and a year ago little general change was shown by the returns.

The percentage of Trade Union carpenters and joiners in the United Kingdom unemployed at the end of May was 4·4, as compared with 4·3 in April and 5·4 a year ago. Compared with April, six districts showed a decline and five districts an improvement, while one district showed no change; compared with a year ago seven districts showed an improvement and five a decline. The percentages of Trade Union plumbers unemployed for the same periods were 7·7, 7·1, and 7·9 respectively.

London.

Employment continued dull generally, and was worse than in April. Trade Union Returns relating to carpenters and joiners in the London district showed that 8·9 per cent. were unemployed at the end of May, against 7·6 per cent. in April, and 8·2 per cent. in May, 1906. The percentages for plumbers were 12·5, 9·3, and 13·7 respectively.

Northern Counties and Yorkshire.

Employment continued dull generally (except with painters), but showed an improvement compared with April. With carpenters and joiners at Leeds it was reported as better than in any former month during 1906-7. Builders' labourers at Newcastle reported employment as good.

Lancashire and Cheshire.

Employment was quiet generally.

Midland and Eastern Counties.

Employment continued dull, but was better on the whole than a month ago, partly owing to preparations for the holiday season on the East Coast. At Redditch employment was fair; at Coventry fair, but declining; at Worcester good. Bricklayers and carpenters at Derby were fairly well employed.

Southern and Western Counties and Wales

Employment was dull, except with painters, and except also with bricklayers at Plymouth and masons at Cardiff, who were fairly well employed.

Scotland.

Employment was fair with carpenters and joiners and good with painters. With masons, plumbers, plasterers and slaters it was dull, and worse than in April. With bricklayers it was bad at Glasgow and fair at Edinburgh. At Dundee employment was fair generally, and better than in April.

Ireland.

Employment was dull at Dublin and Cork, and fair at Belfast. Painters generally were well employed.

CHANGES IN RATES OF WAGES.

The Board of Trade reports that 400 bricklayers at Coventry have received an advance of wages of ¼d. per hour, from 8¾d. to 9d., the change dating from April 1st.

STRIKES.

A strike of plumbers at Liverpool took place on May 1st against an alteration in hours during the winter months. 168 men are affected by the strike.

Llanelly masons recently demanded an advance in wages of ½d. per hour. The present rate is 8d. All the firms, with the exception of Messrs. Brown, Thomas and John, were wi'ling to accede to the demand. The Union called all the men out on June 10th, and 150 at once ceased work, and building is completely suspended. An early setlement of the difficulty is hoped for.

On March 6th a strike occurred of 600 sanitary pressers in North Staffordshire for an advance in the making price for one article. An amicable settlement was effected in May.

OVERTIME.

A conference of the building trades was held in London on June 6th, the delegates present representing a dozen trade unions, comprising a membership of about 190,000. After consideration three resolutions were agreed to, declaring that as the prosperity of a nation depended upon the spending power of the majority, it was necessary to maintain a good standard of wages, and the rapid spread of labour-saving appliances made it necessary to consider the limitation of the hours of work, that unemployment was increased by systematic overtime, and that both the employers' and workers' associations ought to co-operate in abolishing unnecessary overtime. It was resolved to call a further conference to decide how to carry out the resolutions.

UNIFORM HOURS FOR THE WHOLE COUNTRY.

Important steps are in progress at the instance of the various sections of the building trade to strengthen the United Kingdom Building Trades Federation so as to make it possible to control trade difficulties arising on building contracts. In Manchester the force of this movement was displayed some months since in connection with the erection of the new Infirmary buildings. On that occasion the grievance of one section of the men employed on the contract was successfully made a common cause, even to the extent of a threatened general strike. Just now the federation is locally negotiating a difficulty at the Prestwich Hospital at Blackley. The same spirit is stated to be extending throughout the whole country. Not only are the separate unions federating to remove what are called undesirables from building contracts and to force them into the ranks of the different organisations, but they also are aiming at dealing with violations of the Government fair wages resolution of 1891, and there is a strong feeling in some districts that the time has come when all the building trades should have a uniform time in all localities for commencing and ceasing work. This question has special reference to the large number of members unemployed during the winter season and the best way of absorbing them. It will form the subject of a resolution at the conference of the federation at Derby.

EMIGRATION TO CANADA.

The Joint Emigration Committee of the East End Fund and Charity Organisation Society, of Denison House, Vauxhall Bridge Road, London, has been appealing for help to send to certain employment in Canada workmen belonging to the building trades who are unable to find work, together with their families. Reference was made to the statement of Mr. John Burns in the House of Commons that more than four times as many men entered the building trade between 1890 and 1900 as entered it between 1880 and 1890. The Chairman of the Committee contends that the trade is greatly overstocked, and many are losing all hope of continuing to make a living. Men with long characters as good workmen are reduced to casual work on perhaps one or two days a week, or are thrown out altogether; while the demand for labour in Canada is still, in spite of the numbers who have gone there, quite unsatisfied, and a good and assured position awaits every capable labourer and mechanic who lands there. Considerable sums of money have been provided from the rates under the Unemployed Act in aid of emigration, and with the best results. But this is not enough. There are many deserving cases which for various reasons are ineligible for these grants, and indeed the grants are now practically stopped altogether for this season. The Joint Emigration Committee has been sending out some hundreds of these cases this year, but there are still many remaining which have been or are being investigated, and the despatch of which it has been compelled to postpone indefinitely because its funds are exhausted.

Current Rates of Wages in Large Centres.

Towns.	Masons.	Bricklayers.	Carpenters and Joiners.	Plasterers.	Slaters.	Plumbers.	Painters.	Labourers.
	d.	d.	d.	d.	d.	d.	d.	d.
Aberdeen	8	—	8	8	8	8	8	4½–5
Accrington	9	9	8½	9	7½	8½	—	5½–6
Ashton-under-Lyne	9½	10	9	10	8½	9	8½	5½–6½
Barnsley	9	9	8½	9	8½	8	8	6½
Barrow-in-Furness	9	9	8¾	9	9	8¼	8¼	6–6½
Bath	7½	7½	7½	7½	7½	6½ 7½	6½	5–5½
Belfast	8½	8½	8½	8½	8	8½	8½	19s. wk
Birkenhead	9½–10	9½	9½	9½	9	9½	8½	5½–6½
Birmingham	10	9½	9½	10	9	9½	8½	6½–7
Blackburn	9½	10	9	9	9	9	8	6
Blackpool	9¾	9½	8½	9½	8½	9	8½	5½–6
Bolton	9½	10	9½	10	9	9	8½	6½–7
Bournemouth	8	8	8	8	8	8	7½	5½
Bradford	9	9	8½	8½	9	9	8	6–6½
Brighton	9	8	8	8	8	9	7	5½
Bristol	9	9	9	9	9	9	8½	6
Burnley	—	—	8½	—	—	—	—	—
Burton-on-Trent	8½	8½	8½	—	—	—	—	5¾–6
Bury	9½	10	9½	9	9	9	8½	5–6½
Cambridge	8½	8	8	8½	8	8½	6½	5–5½
Cardiff	9	9	9	9	9	9	8½	5½
Carlisle	8½	8½	8	8	9	8	8	5–5½
Chatham	8	9	8½	9	9	8½	7	5½
Cheltenham	8–8½	8	8	7¾	—	8	7½	5
Chester	9	9	8½	9	9	8½	7½	5–5¾
Coatbridge and Airdrie	9½	9½	9	9½	9	8½	9	6
Colchester	8	8	8	9	8	9	6 6½	5–5½
Cork	7⅔	7⅔	7⅔	7⅔	7⅔	8	8	3⁵⁄₉
Coventry	9	8¾	9	9	9	9	8	6
Crewe	8½	8	7	9	8	8	7	5–6
Darlington	9	9	8½	9–9½	9½	8	7½	6
Darwen	9½	9½	9	9	9	9	8¼	6
Derby	9	9	8½	9	9	8½	7½	5½–6
Dublin	8–8½	8½	8–8½	8	8	8½	7½	4¼–4½
Dudley	8½	8	8	8½	8	8	7	5–5½
Dundee	8½–9	10	9	8½	8½	9½	8½	5¼–5½
Eastbourne	8½	8	8	9	pce.	8	7½	5½
Edinburgh	8½	9½	9	9	—	9	—	5½
Exeter	8	8	7½	7½	7½	7½	6½	5
Glasgow	—	9½	10	9½	9	9	9	5½–6
Gloucester	7½	8	8	7½	7½	8	7½	5
Greenock	9½	10	9	9½	9½	9	9	5½
Grimsby	—	9	8	9	pce.	—	7½	6–7
Halifax	9	9	8¼	8½	8½	8	7½	6
Hartlepools	9½	9½	9¼	9½	—	—	—	6½–7
Hastings and St. Leonards.	8½	8	8	8½	—	8	7	5½–6
Huddersfield	9	9	8½	8½	9	7½ 8	7½–8	6
Hull	9¾	9	9	8	9	9	9	6½–8
Ipswich	8	8	8	9	9	8	6½	5–5½
Keighley	8½	8½	8	7½	8½	7½	7½	6
Lancaster	9½	10	8½	9	9	8	8½	5½–6
Leeds	9½	9½	9	9½	9	9	8	6½–7
Leicester	9	9	9	10	9	9	8	6½–7
Leigh	9½	9½	9½	9	8½	9	8	6–6½
Lincoln	8½	8	8	9	8	8	7	5–6
Liverpool	9½–10	9½	9½	9½	9½	9½	8½	5–6
London	10½	10½	10½	11	—	11	—	—
Londonderry	7	7	7	7	6½	7	7½	15s. wk.
Macclesfield	8	8	8	7¾	6½	7½	7½	5
Manchester	9½–10	10	9½	10	9	9½	8¾	5½–7
Merthyr Tydfil	8½	8½	8	8½	8½	8	7½	5½
Middlesbrough	9	9½	9¼	9½	8½	9	8	6¼–6¾
Newcastle	9½	9½	9½	9½	9½	9	8½	6¼
Newport (Mon.)	8½	8½	8½	8½	8½	8½	7½	5½
Northampton	8½	8½	8½	8½	—	8½	7½–8	5½
North Shields	9½	9½	9½	9½	9½	9	9	6¼–6½
Norwich	8	8	8	8	8	8	6½	5
Nottingham	9½	9	9	10	9	9	8½	6½
Oldham	9½	10	9½	9	8½	9	8½	5½–7
Oxford	8½–9	8	8	8	8	9	7	5½
Paisley	9	9½	9	9½	9	9½	9	6
Perth	8	10	8	8	8	8	7½	5½
Plymouth	8	8	8	8	8	8	7	5
Portsmouth	8½	8½	8	8½	pce.	7½	6½ 7	6
Preston	9½	10	9	8½	8½	8½	8½	5½–6
Rochdale	9½	10	9	9	8¼	9	8½	5½–6½
Rotherham	9½	9½	8½	8½	8	8½	7½	6
St. Helens	9	9	9	9	9	8½	8¼	5½–6
Scarborough	8½	8½	8	8½	33s. wk.	8	7½	6
Sheffield	9½	9½	9	9	9	9	7½	5½–6½
Southampton	8	8	8	8	pce.	8	7	5
Southport	9	9	8¾	9	9	9	8½	6
South Shields	9½	9½	9½	9	9½	8¾–	8½	6¼
Stockport	9½	9½	9	10	9	9	8	6–7
Stockton-on-Tees	9	9½	8	8½	—	9	8	6¼–6½
Sunderland	9½	9½	9¼	9½	9½	37s. wk.	8½	6¼
Swansea	8½	—	8½	8½	—	8½	7½	5½
Torquay	7	7	7½	7	7	7	7	4½–5
Wakefield	9	8½	8	8½	8	7½	7½	6
Walsall	9	8½	8½	8½	8½	8½	7¼	5¾–6½
Warrington	8¾	9¼	9¼	9½	8½	9¼	8	6–6½
WestBromwich	9½–10	9	8½	9	pce.	8½	7	6–6½
Wigan	9½	10	9	9	8½	9	8½	5½–6½
Wlverhampton	9	9	9	8½	8	9	7½	6
Worcester	8½9¼	8½	8½	8½	8½	8½	7	5½
Yarmouth	7½	7½	7½	A	7½	7½	6	4–4

A. Done by bricklayer.

Current Market Prices.

FORAGE.

Beans...	per qr.	1 11 0	1 13 0
Clover, best...	per load	4 7 0	4 17 6
Hay, good ...	do.	4 0 0	4 5 0
Sainfoin mixture ...	do.	4 0 0	4 17 6
Straw...	do.	1 8 0	1 14 0

METALS.

Standard Copper ...	per ton	97 10 0	98 0 0
Do. Strong sheets ...	do.	116 10 0	118 0 0
Lead, soft foreign ...	do.	20 0 0	20 10 0
Do. English ...	do.	20 0 0	20 5 0
Do. pipes...	do.	25 10 0	25 15 0
Do. sheets ...	do.	25 5 0	25 10 0
Galvanised Corrugated sheets ...	do.	13 15 0	14 0 0
Spelter G. M. ...	do.	24 10 0	24 15 0
Angles, Scotland ...	do	7 2 6	7 5 0
Bars, do. ...	do.	8 2 6	8 5 0
Marked bars, Staffs. ...	do	9 0 0	9 2 6
Common bars, do ...	do.	7 5 0	7 7 6
Angles, M'boro. ...	do.	6 15 0	6 17 6
Joists do. ...	do.	6 15 0	6 17 6
Angles, Midlands ...	do.	7 2 6	7 5 0
Joists do. ...	do.	7 2 6	7 5 0
Girder plates, Midlands ...	do.	8 0 0	8 2 6
Angles, Foreign, c.i.f. Thames	do.	7 5 0	7 7 6
Tees do. do. do.	do.	7 7 6	7 10 0
Joists, do. do. do.	do.	6 10 0	6 12 6
Channels do. do. do.	do.	6 12 6	6 15 0
Tin, Foreign ...	do.	187 0 0	188 0 0
Do. English ingots ...	do.	191 0 0	192 0 0
Zinc, sheets, Silesian, ...	do.	30 0 0	30 10 0
Do. do. V.M. ...	do.	30 10 0	31 0 0

MISCELLANEOUS.

		£ s. d.	£ s. d.
Bricks Stocks, d/d to job	per 1,000	1 17 0	—
Do. Flettons on rail ...	do.	1 7 0	—
Do. Pressed Wire Cuts, d/d to job ...	do.	2 0 0	—
Do. Blue brindled wire cuts ...	do.	1 5 0	—
Do. do. wire cuts ...	do.	1 9 0	—
Do. do. pressed facings ...	do.	2 0 0	—
Coke Breeze, into carts at gasworks ...	per load	0 2 0	—
Do. d/d to job ...	do.	0 4 0	—
Sand ...	per yard	0 7 6	—
Ballast ...	do.	0 6 6	—
Cement ...	per ton	1 13 0	—
Lime ...	do.	1 4 0	.
Glass, English Sheet, in crates of stock sizes, 15oz., 2nds ...	per sq. ft.	0 0 3	—
Do. do. do. do. 3rds.	do.	0 0 2	—
Do. do. do. 21oz., 2nds.	do.	0 0 5	—
Do. do. do. do. 3rds	do.	0 0 3	—
Do. do. do. 26oz., 2nds	do.	0 0 6	—
Do. do. do. do. 3rds	do.	0 0 4¼	—
Do. do. do. 32oz., 2nds	do.	0 0 8	—
Do. do. do do. 3rds	do.	0 0 6	—
Do. English patent plain rolled plate in stock crates ⅛ ...	do.	0 0 2	—
Do. do. do. ³⁄₁₆	do.	0 0 2¼	—
Do. do. do. ¼	do.	0 0 2	—
Granite Chippings ...	do.	0 10 6	—
Do. do. ¼in. ...	do.	0 11 6	—
Do. Broken, 1½in. ...	do.	0 15 6	—
Do. do. 2in. ...	do.	0 15 0	—
Do. do. 2½in. ...	do.	0 14 6	—
Do. Kerb, Norwegian 6×12 and 12×6 in river ...	per foot	0 1 2	—
Do. do. do. circular	do.	0 1 5	—
Do. do. do. 12×8 in river	do.	0 1 5	—
Do. do. do. circular	do.	0 1 8	—
Do. do. Guernsey 6×12 in river	do.	0 1 4	—
Do. do. do. circular	do.	0 1 6	—
Do. do. do. Special, 4×6	do.	1 11 0	—
Do. do. Guernsey, 3×6	do.	1 10 0	—
Do. do. do. 3×7 & 3×9	do.	1 8 6	—
Do. do. do. 3×5	do.	1 10 0	—
Castor Oil, French ...	per cwt.	1 9 0	—
Colza Oil, English ...	do.	1 14 3	—
Copperas ...	per ton	2 0 0	—
Lard Oil ...	per cwt.	2 15 0	2 17 0
Lead, white, ground, carbonate ...	per ton	16 0 0	—
Do. red ...	do.	15 0 0	19 0 0
Linseed Oil, barrels ...	per cwt.	1 7 7½	—
Petroleum, American ...	per gal.	0 0 6½	0 0 6¾
Do. Russian ...	do.	0 0 5⅞	0 0 6⅛
Pitch ...	per barrel	0 10 0	—
Shellac, orange ...	per cwt.	10 11 0	—
Soda, crystals ...	per ton	3 2 6	3 5 0
Tallow, Town ...	per cwt.	1 13 0	—
Tar, Stockholm ...	per barrel	1 5 0	—
Turpentine ...	per cwt.	2 2 6	—

TIMBER.

SOFT WOODS.

		£ s. d.	£ s. d.
Fir, Dantzic and Memel	per load	3 15 0	5 15 0
Pine, Quebec, Yellow ...	do	4 2 6	7 5 0
Do Pitch, American ...	do	3 17 0	6 5 0
Laths, log, Dantzic	per cu. fath.	4 0 0	6 0 0
Deals, Archangel, White, 2nd, 3×9	per std. do.	10 0 0	—
Do. do. do. 3rd, 3×9	do.	9 0 0	—
Do. do. do. 4th, 3×11	do.	8 5 0	—
Do. Fingermanholman, Yellow, 3×7	do.	7 0 0	—
Do. Granvik, Yellow, 3rd, 4×9	do.	8 0 0	—
Do. Halifax, Hemlock, 3×9	do.	6 10 0	—
Do. Kovda, Yellow, 3rd, 3×8	do.	9 15 0	—
Do. do. do. 3rd, 2½×11	do.	10 15 0	—
Do. Ljusne and Sandarne, Yellow, 2nd, 3×9	do.	15 15 0	—
Do. do. do. 3rd, 3×9	do.	11 0 0	—
Do. Nederkalix and Lulea, Yellow, 2nd, 3×9	do.	9 5 0	—
Do. Mo, Yellow, 3rd, 3×7	do.	9 5 0	—
Do. do. do. do. 3rd, 2½×7	do.	9 15 0	—
Do. Quebec, Spruce, 3rd, 3×9	do.	9 5 0	—
Do. Riga, White, unsorted, 3×8	do.	7 15 0	—
Do. do. do. do. 3×7	do.	7 15 0	—
Do. do. Yellow, unsorted, 2½×7	do.	7 0 0	—
Do. St. Petersburg, Yellow, unsorted, 3×11	do.	7 10 0	—
Do. do. do. do. 3rd, 2½×7	do.	8 0 0	—
Do. St. John, Spruce, 1st, 2nd & 3rd, 3×8	do.	7 15 0	—
Do. do. do. do. 3×7	do.	7 15 0	—
Do. do. do. 1st, 3rd, & unsorted, 3×7	do.	8 0 0	—
Do. do. do. unsorted, 3×9	do.	8 15 0	—
Do. do. do. do. 1st, 3rd, & unsorted, 2½×7	do.	8 5 0	—
Do. Skelleftea, Yellow, 1st, 3×9	do.	11 0 0	—
Do. do. do. 5th, 3×9	do.	9 5 0	—
Do. do. do. unsorted, 3×9	do.	7 15 0	—
Do. do. do. do. 3×7	do.	7 15 0	—
Do. Swartwik, Yellow, 3×9	do.	7 0 0	—
Do. Trangsund, Yellow, 3rd, 3×11	do.	7 10 0	—
Do Umba, Yellow, 3rd, 3×9	do.	10 15 3	11 0 0
Do. Kaunissaari, Yellow, unsorted, 2½×7	do.	9 0 0	—
Do. Pernoviken, Yellow, 1st & 2nd, 2½×7	do.	9 10 0	—
Battens, Christianssand, Yellow, unsorted, 2×4	do.	8 5 0	—
Do. Granvik, Yellow, 3rd, 2×9	do.	8 0 0	—
Do. Ingramport, Yellow, unsorted, 2×4	do.	7 5 0	—
Do. Kalmar, Yellow, unsorted, 2×4	do.	8 15 0	—
Do. Kovda, Yellow, dry 3rd, 2×9	do.	11 5 0	—
Do. Lulea, Yellow, 1st, 2×6½	do.	9 5 0	9 10 0
Do. do. do. do. 2×5	do.	9 15 0	—
Do. Nederkalix & Lulea, Yellow, 2nd, 2×6½	do.	8 5 0	—
Do. do. do. do. 2×5	do.	8 10 0	—
Do. do. do. do. 2×6	do.	9 0 0	—
Do. do. do. do. 2×4	do.	9 15 0	—
Do. do. do do. 2×7	do.	9 0 0	—
Do. do. White, do. 2½×6½	do.	7 0 0	—
Do. Sandarne, Yellow, 1st and 2nd, 2×4	do.	10 10 0	—
Do. Sundswall, Yellow, 1st & 2nd, 2×4	do.	9 15 0	—
Do. Torrefors, Yellow, 3rd, 1×6½	do.	8 5 0	—
Do. Wifsta Warf, Yellow, 2nd, 1×9	do.	12 0 0	—
Do. Wyburg, Yellow, unsorted, 1×4	do.	8 5 0	
Flooring Boards, Fredrikshald, Yellow, 2nd, 1×6	per sq.	0 11 0	—
Do. do. White, unsorted, 1×5½	do.	0 8 6	0 9 0
Do. Johannesvik, Yellow, 2nd, 1¼×6	do.	0 13 6	—
Do. do. do. 3rd, 1¼×6	do.	0 12 9	—

HARD WOODS.

Ash, Quebec ...	per load	4 5 0	7 10 0
Birch, New Brunswick ...	do.	2 12 6	5 5 0
Do. Quebec ...	do.	2 12 6	5 5 0
Cedar, Cuba ...	per ft. sup.	0 0 3¾	0 0 5
Do. Honduras ...	do.	0 0 3¾	0 0 5
Elm, Quebec ...	per load	4 2 0	9 5 0
Jarrah, planks ...	per ft. cu.	0 2 6	0 3 0
Mahogany, Average Price for Cargo, Honduras	per ft. sup.	0 0 5½	0 0 6½
Do. Cuba ...	do.	0 0 5	0 0 6
Do. African ...	do.	0 0 4	0 0 5½
Do. Lagos ...	do.	0 0 4	0 0 5½
Oak, Wainscot ...	per log	3 5 0	7 10 0
Teak, Indian, logs ...	per load	10 15 0	21 10 0
Do. do. planks ...	do.	14 5 0	22 10 0
Whitewood, American, logs ...	per ft. cu.	0 1 3	0 1 6
planks and boards ...	do.	0 2 0	0 4 0

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CONCRETE AND STEEL SUPPLEMENT (MONTHLY).

DISPOSAL OF HORIZONTAL FORCES ON IRON ROOFS.

By Max am Ende, M.Inst.C.E.

The first question to be answered in the design of an iron roof is how to dispose of the horizontal forces. On that answer depend the main features of the design. Timber roofs, now almost confined to cases where the clear span is small, are as a rule not subject to great stress from wind pressure, and the walls on which they rest are, for example in dwelling-houses, not very high above the next floor under them, so that the horizontal forces can often be ignored, but iron roofs where these conditions are different are almost always subject to horizontal forces which must be taken into account; in some cases they are even greater than the vertical forces.

In respect of the stresses, there are two kinds of roof principals, namely—*arch principals,* where the vertical as well as the horizontal forces produce horizontal reactions in the two supports, and *truss principals,* where only the horizontal forces produce horizontal reactions. In the former case both supports are constructed as *abutments,* while in the latter only one is so constructed, and the other as a *vertical support,* which is unable to react horizontally. This is necessary in order to exclude horizontal reactions arising from the expansion of the principals due to vertical loads and to a change of temperature; they create stresses in the structure which should be avoided if possible. Figs. 1 and 2 are examples of arch principals. The latter does not represent an arch in the usual sense, but in respect of abutment reactions and stresses there is no material difference between it and an arch. Both principals consist of two triangulated systems of bars supported on three hinges, A, C, B: the simplest possible support, as thereby the direction of the abutment reactions is determined. Figs. 3 and 4 are examples of truss principals, consisting only of one triangulated system supported on the two hinges A and B; but the one support, unable to react otherwise than vertically, is symbolically shown as a column hinged at its base C as well as at A, so that we have here also a structure on three hinges. A roller bearing at A on a wall would have, however, the same effect as the hinge C. Fig. 5 is a combination of both kinds of principals. As an arch its abutments are replaced by a tie AB, and as a truss it has in the tie an additional member; as such it is called a *tied arch.*

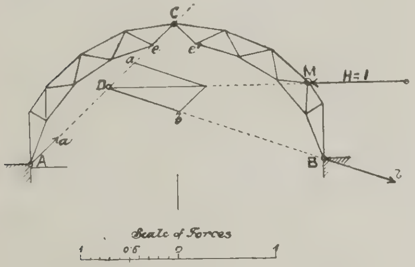

FIG. 1.

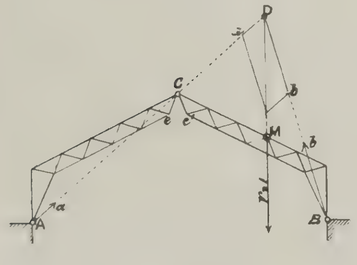

FIG. 2.

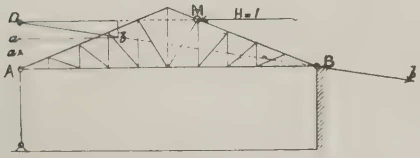

FIG. 3.

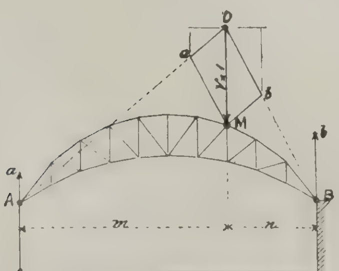

FIG. 4.

None of the structures shown has a *superfluous* member—that is to say, if any one member or bar were removed the structure must collapse—unless the bars and their connections are very stiff. If, on the contrary, a member is added, for example between e and e' in Figs. 1 and 2, such member is superfluous and would be the cause of a different position of the abutment reactions and of different stresses throughout the structure. These cannot be dealt with in the present article, and structures without superfluous members will only be considered. Methods of calculation of stresses in triangulated systems from forces acting upon them are also not considered within the present discussion, but only methods for finding these outer forces and reactions. Without these no calculation of stresses in roof principals can be made.

As every force can be resolved into a vertical and a horizontal component acting in the same plane, the present problem can be reduced to finding the abutment or support reactions from a vertical force $V=1$ and from a horizontal force $H=1$. The reaction from several forces is simply the sum or resultant of the single reactions, which also may be resolved, if convenient, into vertical and horizontal reactions.

In Fig. 1 the horizontal force $H=1$ acts on the triangulated system BC in point M. The system AC, as there is no load on it, can only resist in the straight line AC. Its intersection with the force H is D. Draw DB and construct a parallelogram of forces with $H=1$ on D. Then Da and Db are the abutment reactions Aa and Bb. In Fig. 2 the vertical force $v=1$ acts on the system BC in point M. The system AC resists in the line AC. Its intersection with the force V is D. Draw DB and the parallelogram. Then Da and Db are the reactions.

In Fig. 3 the horizontal force $H=1$ acts on point M. The support at A can only react in the line AC. Its intersection with the force H is D. Draw DB and the parallelogram. Then Da and Db are the reactions. In Fig. 4 the vertical force $V=1$ acts on point M. The reactions, both vertical, can be found on the principle of the lever—viz., $\frac{n}{m+n}$ at A and $\frac{m}{m+n}$ at B; or by assuming any point D in the vertical V, drawing AD, BD and the parallelogram. The vertical distances of points a and b from D are the reactions.

In Fig. 5 the horizontal force $H=1$ acts on the system BC in point M. B is an abutment and A a vertical support, but with regard only to the system AC the tie AB transforms the support A into an abutment so that Aa is the abutment reaction derived from the parallelogram aDb. The horizontal component of Aa—viz., Aa''—is the tensile stress in the tie and the vertical component is the reaction of the column AC. The tension in the tie increases the pulling reaction at B, so that Ba'' is the total reaction. The same result is obtained if the structure including the tie is regarded as a truss. The parallelogram $a'D'b'$ gives the total reactions direct, and the stress in the tie is found by resolving $a'D'$ $(=a'A)$ into the components aA and $a''D$. In Fig. 5a the force $H=1$ acts in the same point, but support and abutment are interchanged. We find the stress in the tie to be a compression much greater than the tension in Fig. 5. As all vertical forces produce tension in the tie the danger in any practical case that compression predominates is not great, but it increases with the pitch of the roof and the test should be made. If, however, the choice is open, the vertical support should not be placed on that side of the roof where the strongest winds come from.

Wind Pressure.—The intensity of the wind pressure on a surface at right angles

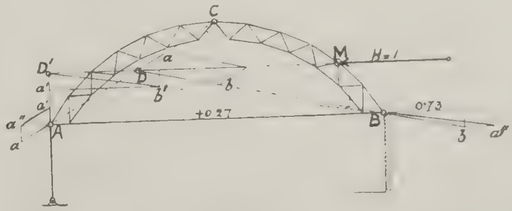

FIG. 5.

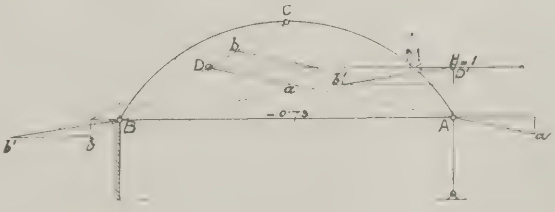

FIG. 5a.

to its direction is according to various rules assumed at W=28 to 56lbs. per sq. ft. Generally, the lower figure may be taken for partially sheltered and the higher for the most exposed localities. The direction of the wind is usually assumed to be inclined to the horizontal at an angle of 10 degrees. It is further assumed that the tangential component of the wind pressure acting on a surface inclined to its direction is *inactive*, and that only the normal component is to be taken into account. Steps in the roof covering, as they often occur, should be reckoned as surfaces normal to the wind pressure. Nevertheless, owing to the loss of the tangential component, the wind pressure on a roof *in the direction* of the wind pressure is almost always less than it would be on a normal plane equal to the size of the projection of the actual surface on that plane. Thus, for example, the wind pressure on a smooth cylinder of the length l and the radius r would be $\frac{l r \pi}{3} w$ instead of $2lrw$, and the wind pressure on a sphere $\frac{r^2}{2\pi} w$ instead of $r^2 \pi w$. These are the sums * of the components in the direction of the wind; but there are also the components at right angles to it which must also be reckoned with.

Calculation with unit forces.—The actual loads and wind pressure on a roof cannot be known before the stresses and the details of the design are determined and as the stresses would have to be calculated on assumed loads liable to correction, it would be necessary to repeat the calculation until sufficient accuracy is obtained. Instead of doing this it is often convenient to calculate with unit forces. The system, Fig. 2, for example, has eleven point of application, M, for the forces V=1 and H=1. Twenty-two or, as the structure is symmetrical, eleven parallelograms of forces are required to determine the abutment reactions. The stresses in the various members from the unit forces can now be calculated and the results recorded in a table. Such record shows at a glance which loads produce tensile and which compressive stresses in a member. Assumptions must now also be made for the loads, but the calculations and their corrections which now follow are only multiplications with the figures in the table, but no calculations of stresses. Unit forces are always used in the calculation of structures with superfluous members.

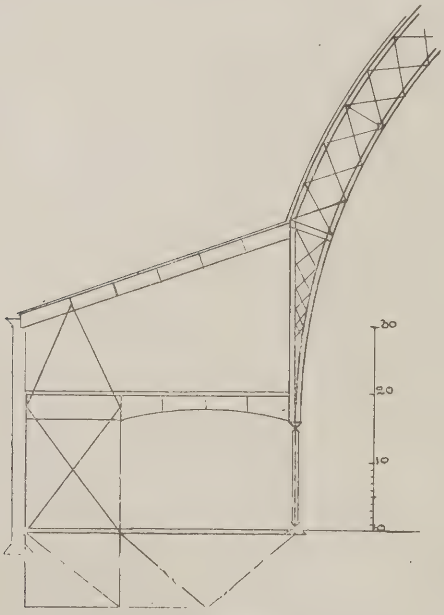

FIG. 6.—ABUTMENT FRAME, "OLYMPIA."

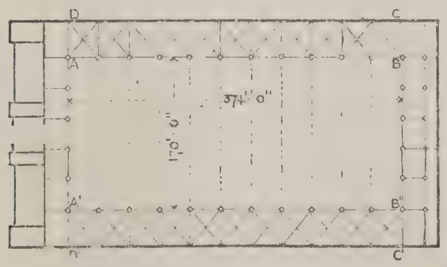

FIG. 7.—GALLERY PLAN, "OLYMPIA."

Abutments.—The record of the various abutment reactions—which are the forces acting on the abutment, if reversed in direction—shows directly which forces would overturn the abutment upon a certain critical point as fulcrum one way and which would overturn the other way so that the most dangerous position of the forces is at once apparent. For masonry abutments the critical point is usually assumed to lie at one-third of the length of any normal section from either extremity. Abutments for structures, Figs. 1 and 2, can easily be constructed fulfilling this rule, and therefore roof principals of a very large span, as for example those of the St. Pancras Railway Station, London (240ft.), of the Machinery Hall at the Paris Exhibition, 1890 (100 metres), and of several railway stations in Germany and in the United States of America, have been designed according to these systems. In cases, however, where the springing of the arch-principals is at some height above the ground, masonry abutments would generally be too bulky to be admissible, and iron frameworks are preferable. In the Crystal Palace, Sydenham, the arch-principals of the nave and the transept are adjoined on both sides by several aisles, and diagonal bracing in one of them would be almost sufficient to counteract the thrust from all forces. It is said that in order to make the principals independent of such bracings as abutments and to be able to omit them, where a free passage might be required at any time, they were constructed of an unusually great depth so that they should be strong enough to act as trusses without thrust from the load. The arches so constructed and being at a great height above the ground constitute the most characteristic and admirable feature of the Crystal Palace, but it was noticed during the erection that some of them expanded horizontally at the springing under the load, and this led to the insertion of more bracing. The extent, however, to which the principals now act as angles and to which as trusses is not known.

In the National Agricultural Hall (so called "Olympia") at South Kensington, which has an arched roof of much larger span (170ft.) a more elaborate arrangement had to be devised for disposing of the horizontal thrust. The aisles, Fig. 6, are 40ft. wide, and by utilising about 14ft. of this space near the outer wall for an abutment frame, and by continuing the frame underground to the column under the arch, a space of 26ft. adjoining the main span was obtained free from obstructions. Before adopting this mode of construction, another way of disposing of the thrust was studied. It consisted of two girders ABCD, Fig. 7, in a horizontal position under the gallery floor of the aisles having their supports in the lines CC' and DD' where the end screens are situated. But these girders, 40ft. deep and 375ft. long, would not have obviated the construction of very strong vertical frames AD and BC for carrying the thrust from the wind pressure on the whole roof to the ground, and while some of the details of these girders would have been inconveniently heavy it was particularly undesirable to make the stability of the whole building dependent on two frames AD and BC.

A plan similar to this was, however, adopted later in a building of smaller dimensions. Fig. 8 is the roof plan of the Drill Hall and offices of the Scottish Volunteers, Westminster. The outer walls follow the lines WW, and the six arch principals rest on these walls in the lines DC and D'C'. The outer principals DAA'D' and CBB'C' are tied arches, and the thrust of the four intermediate arches, which have no ties, is taken by the girders ABCD. On the ground floor, the drill hall, there are no columns whatever within the walls WW, and two stories of offices and side galleries are suspended from the roof principals. The thrust from wind pressure is therefore small compared to that from the loads, and as, moreover, the building lies in a sheltered position, adjoined on both sides by brick buildings, vertical frames AD and BC could be dispensed with over the ground floor.

Principals of the class Figs. 3, 4 and 5, having one vertical support and one abutment, are often constructed for large sheds or railway stations. If there are complete or partial enclosures at each end a windbracing between the principals and the purlins immediately under the roof covering may be made to serve in place of the girders ABCD in Figs. 7 and 8, the vertical frames AD and BC being then placed into the end enclosures; otherwise the side enclosure on the abutment side must be constructed as such, either as a wall with buttresses or as the wall of an adjoining building with floors. Where this is impracticable and where also the wind pressure on the side enclosure has to be reckoned with, systems of the class Figs. 1 and 2 are preferable. A peculiar form of principal, Fig. 9, is used for workshops with an overhead travelling crane. Its rectangular form is the outcome of the condition that the traveller must be in the highest possible position and that the crab must be able to sweep the whole area between the uprights. The latter are rigidly connected to the transverse girder at A and B, but have hinges or flat bearings of no great rigidity at the base. The ridges of the roofing may run parallel to the girders immediately above them and each gutter would be supported by the longitudinal beams A, C, C, B. Principals of this kind with a clear opening 54ft.

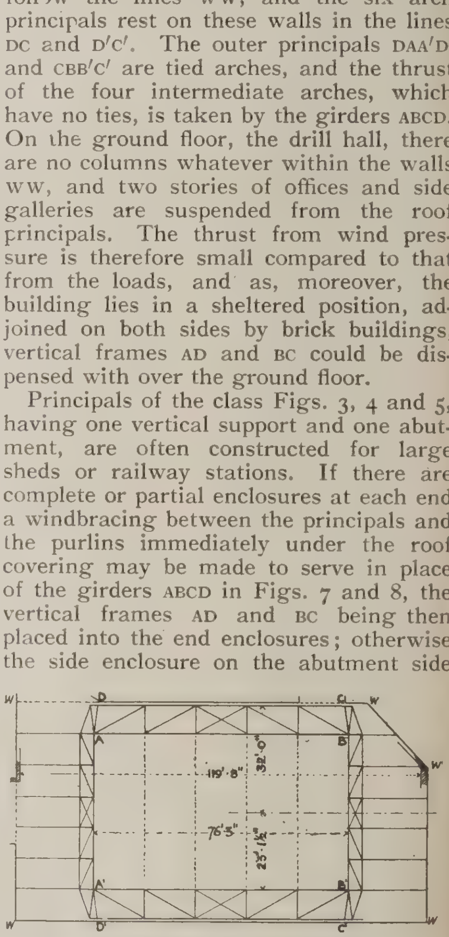

FIG. 8.—ROOF PLAN. DRILL HALL OF SCOTTISH VOLUNTEERS, WESTMINSTER.

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*For the cylinder: $2rlw \int_0^{90} \cos^3 a da$, where a is the angle of inclination of the radius at the surface element to the direction of the wind; and for the sphere $2r^2 \pi w \int_0^{90} \sin a \cos^3 a da$.

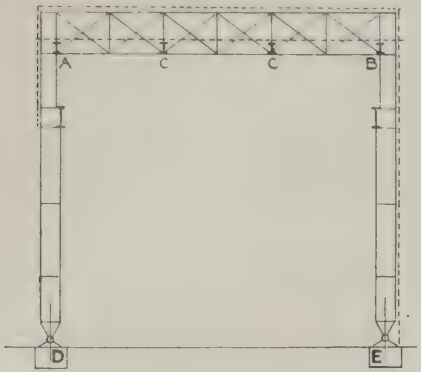


FIG. 9. ELEVATION OF PRINCIPAL, WORKSHOP, DARLINGTON.

high and 58ft. wide have been constructed for one of the workshops of the Cleveland Bridge and Engineering Co., Darlington, a building about 750ft. long.

The usual plan of construction in such cases hitherto has been that according to Fig. 3. The uprights, at least on one side, would be widened out at the base and rigidly connected to a block of masonry heavy enough to withstand the moment of the wind pressure on roof and side enclosure, as also the vibrations from the traveller. In the present case this would have been a more costly arrangement than the one adopted, where the abutments at D and E are very small.

FIRST STEEL-FRAME BUILDING IN EDINBURGH.

The erection of a large steel-frame building in Princes Street is a notable departure from the established methods in Edinburgh. The new building is for a clothing firm—R. W. Forsyth, Ltd., of Glasgow—and the architect is Mr. John J. Burnet, A.R.S.A., of that city. The site was formerly occupied by the Douglas Hotel. The frontage to Princes Street is 90ft., while that to South St. Andrew Street is 70ft. There will be seven floors, including basement. The shop-front on the street level is to be of ornamental woodwork, surrounded by a frame of marble, consisting of piers, columns and frieze. The building otherwise will be of white freestone.

A corner tower will rise to a height of 127½ft. The height of the building to the wall head otherwise will be 80ft. A special feature is the staircase and its electric elevators. Rapidity of construction has been obtained by the adoption of the skeleton steel frame, and although a start was only made to demolish the former stone buildings and clear and excavate the site in the end of May last, it is hoped to have the premises ready for occupation in the early spring.

The floors are of Ferguson's patent fireproof construction. Messrs. James Millar & Sons, of Edinburgh, are the contractors for mason, &c., works, and Messrs. Ferguson, Allen & Co., of Glasgow and London, are contractors for the steel and concrete work.

Concrete Aggregates.—In the article under this title in our issue for December 5th in the first column, second line, after the word "concrete" it should be stated "12ins. × 12ins." In experiment No. 6 after "per cent. of strength" should be "of neat cement." In experiment No. 7 after "water" should be "48," not 4 after 48; "68" should be "60½."

SETTLING TANK AT SOUTH HAYLING WATERWORKS IN COURSE OF CONSTRUCTION.

A WATERWORKS.

In our last week's issue we published on p. 345 a view of the completed reinforced concrete settling tanks at South Hayling waterworks. We now give a view showing the tanks in course of construction with the centering in position. There are two tanks 40ft. by 32ft. 3ins. by 8ft. 3ins. deep, inside measurements. The bottom is 8ins. thick, reinforced with No. 62 expanded steel; the outer walls are 9ins. thick, reinforced No. 62 expanded steel, and supported by buttresses at 10ft. centres. The division-wall is 1ft. thick, reinforced with two layers of No. 62 expanded steel. The cover is 5ins. thick (average), reinforced with No. 61 expanded steel, carried by rolled steel joists at 10ft. centres, on cast-iron columns.

COVERING CONCRETE ROOFS.

For resistance to rain and snow concrete cannot alone be depended upon, especially in this country, and there are various methods which have from time to time been adopted for covering the surfaces of roofs. Some are, of course, expensive, and the problem becomes one not so much of efficiency as economy. A covering that has come into great favour and the use of which is rapidly increasing, particularly in connection with reinforced concrete, is "Ruberoid." We, therefore, publish the accompanying photographs and particulars of the method of application of the material to the roofs of a large reinforced concrete structure just recently completed—namely, the New Bridge Street Goods Station for the North-Eastern Railway

WAREHOUSE, PRINCES STREET, EDINBURGH. JOHN BURNET & SON, ARCHITECTS.

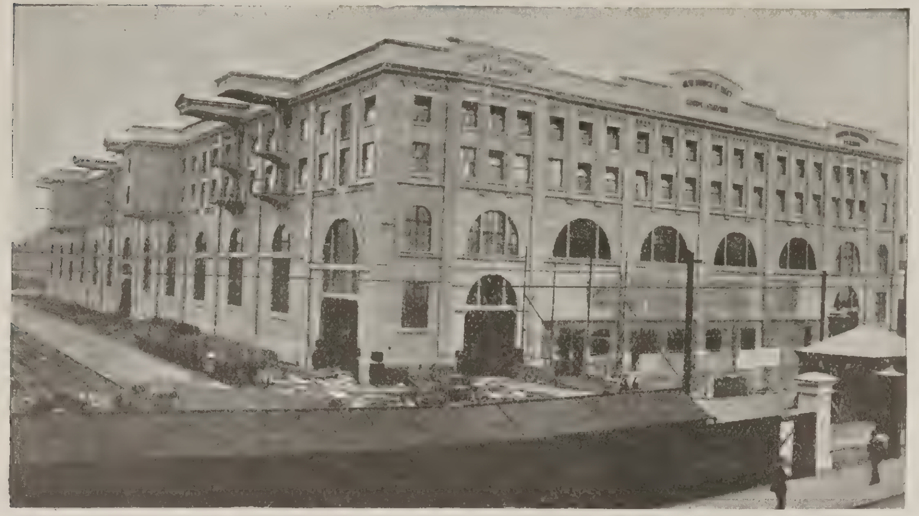


FIG. 1. NEW BRIDGE STREET GOODS STATION, NEWCASTLE-ON-TYNE.

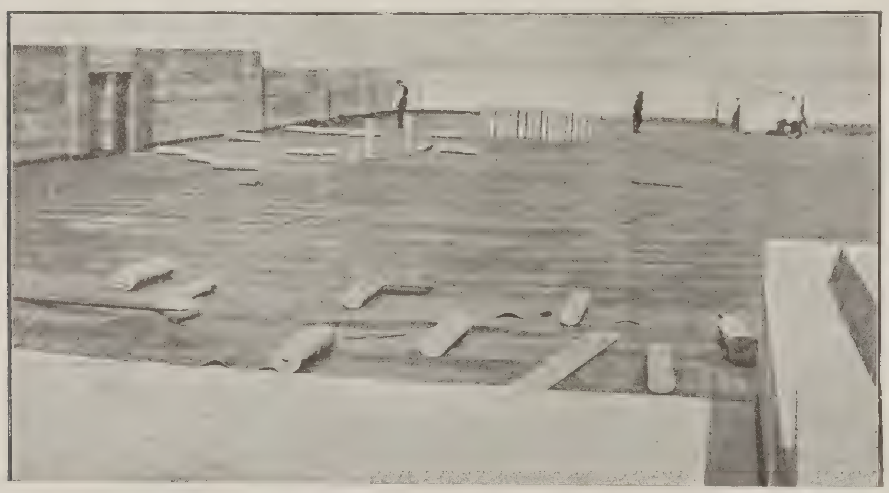


FIG. 2. "RUBEROID" UNROLLED ON ROOF.

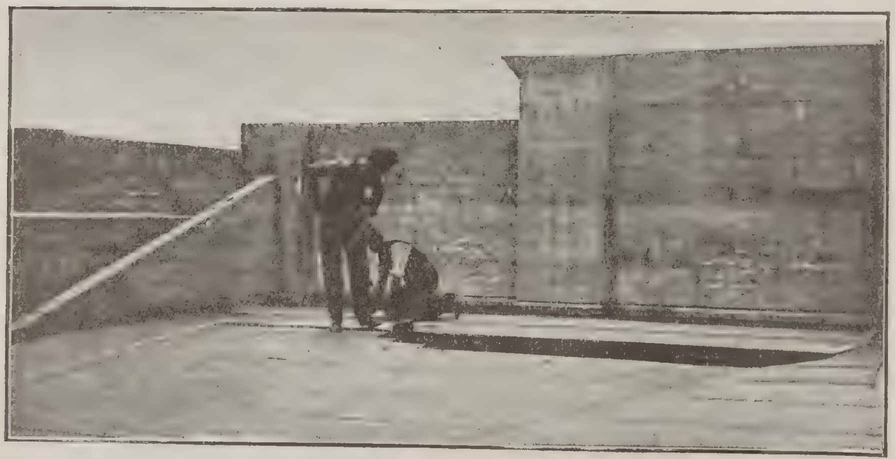


FIG. 3. APPLYING MASTIC.

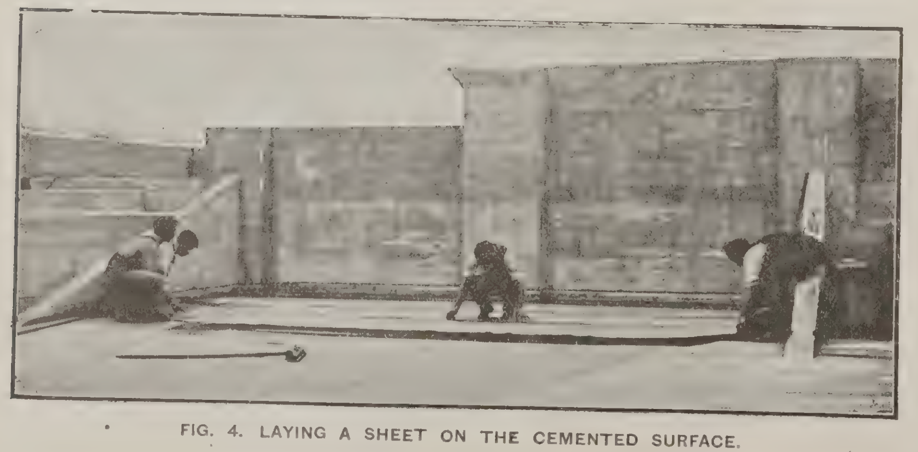


FIG. 4. LAYING A SHEET ON THE CEMENTED SURFACE.

Co., at Newcastle-on-Tyne. Between 7,000 and 8,000 sq. yds. of "Ruberoid" were used on the roofs of this building, of which Fig. 1 is a general view.

We would first explain what is the nature of the material. The basis of "Ruberoid" is similar to rubber, having the same properties of elasticity and waterproofness, while it is free from the disadvantage of oxidation, which is the cause of real rubber becoming hard in course of time and losing its efficiency. It does not contain any rubber. This substance is used to impregnate or saturate a specially-chosen fibrous fabric, and the resulting material is extremely light, elastic, flexible, non-absorbent, acid, alkali, water and weatherproof, is a non-conductor of heat and is unaffected by vibration stresses. It is quite inodorous and does not in any way contaminate rain-water.

"Ruberoid" was first manufactured sixteen years ago, and the results of actual experience have proved it to be suitable for rofing the most permanent buildings. It is now used in all parts of the world, and during the year 1905 65,000,000 sq. ft. of the material were sold. As a result of increase in business, there are now three factories making "Ruberoid"; these factories are all controlled by one company and manufacture the same quality material.

As we have said, "Ruberoid" has of recent years been extensively and successfully employed for weather-proofing concrete roofs. Being extremely elastic, it is unaffected by the concrete cracking or foundations settling. "Ruberoid" is not covered with gravel and has a neat and clean appearance when finished. It will withstand a considerable amount of foot-traffic. The cost of maintenance is practically nil, so that it compares very favourably with other materials used for the same purpose.

The special advantages of "Ruberoid" for reinforced concrete roofs are its extreme lightness (the weight of the material not exceeding 1lb. per sq. yd.), its low cost and its durability.

"Ruberoid" is made in four weights—half, one, two and three-ply. It is 36ins. wide; and there are 72 lineal feet in each roll. The minimum weights are ½-ply 44lbs., 1-ply, 60lbs., 2-ply 80lbs., and 3-ply 100lbs. per roll. Two layers of ½-ply "Ruberoid" were used on the New Bridge Street Goods Station roofs. The work on this particular job was carried out by the manufacturers' own employees.

The preparation of the surface of concrete roofs before laying "Ruberoid" is an important matter, for it has to be borne in mind that the material will assume the surface of the concrete. Care has, therefore, to be taken that the concrete is carefully graded to the right falls and that any "saucers" are filled up. It is, therefore, advisable to use tapered guide-laths instead of depending on the eye judgment of the workmen when making the falls. The most desirable surface is one that is hard and smooth. A well-screeded surface is satisfactory.

It is necessary for the concrete to be thoroughly dry before the application of the "Ruberoid," as there is no possibility of it drying from the outside, once the material is laid.

Fig. 2 shows the "Ruberoid" being unrolled and laid out on the roof of the Newcastle Goods Station, so that it shall become flat and allow it to be cut to fit round

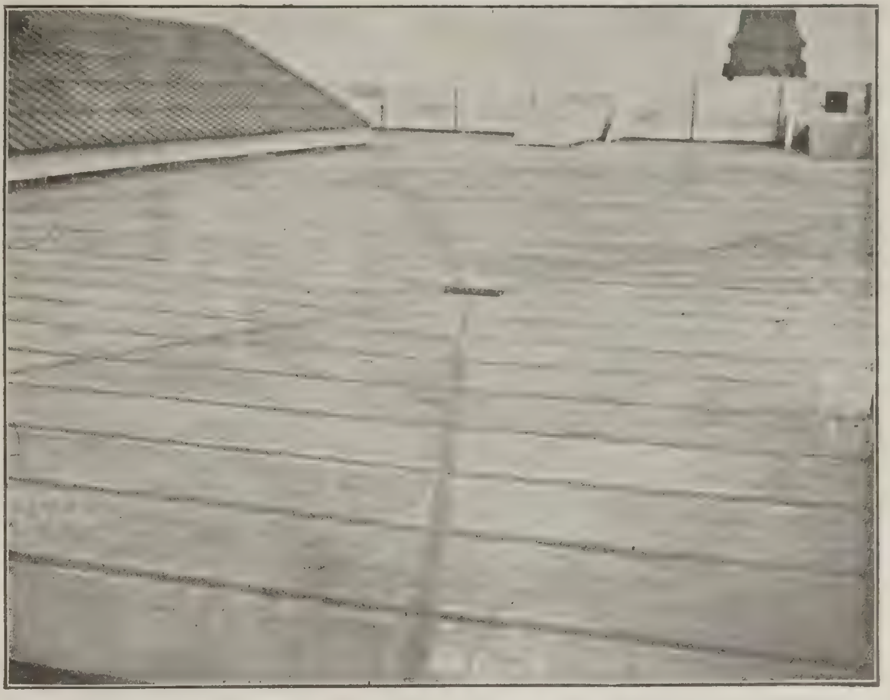


FIG. 5. THE ROOFING COMPLETED.

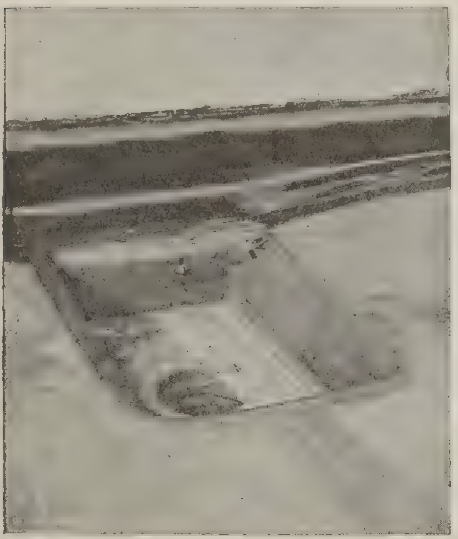


FIG. 6. A CESS-PIT.

all projections, &c. This having been done, a mastic, made from the same basis substance as the "Ruberoid," sheeting is applied by means of squeegees, as seen in Fig. 3. The sheet of "Ruberoid" is then carefully laid on the cemented surface, as shown in Fig. 4, and smoothed down into position. After one layer of "Ruberoid" had been thus applied to the concrete, another is then laid over the first, the width of the strips in each layer being 36ins., and the joints of the top layer breaking joint with those of the bottom layer. Figs. 3 and 4, in fact, do not represent the laying of the first layer of "Ruberoid" direct on the concrete, but show the first layer already completed. The operation of fixing the second layer is, however, exactly similar, the top layer being cemented to the bottom one, as before described. The mastic practically welds the strips into one large sheet. Fig. 5 shows the completed roof. It will be seen from this view that this particular roof was arranged to fall to cesspits, one being shown in the centre of the illustration. It will be noticed that the "Ruberoid" sheets show a joint along the line of what may be called the valley gutters leading to this cesspit. In this way a neat job is secured. Under this joint there is, of course, a layer of "Ruberoid" running diagonally and cemented to the top layer. The cesspits are themselves likewise all water-proofed with "Ruberoid." Fig. 6 shows how the material is carefully worked round the edges, so as to form a thoroughly efficient lap.

All flashings are made with the same material, and as their construction is interesting we shall describe them in detail. Fig. 7 is a sketch showing how the parapet wall springs from the roof. A chase is left in this parapet wall as shown, the bottom edge of this chase being inclined downwards. Holes are also left in the wall to allow for the insertion of plugs. A photographic view of this chase and holes for plugs are shown in Fig. 8. The first and second layers of "Ruberoid" roofing are then carried up the parapet and tucked into the chase, as shown in Fig. 9. A skirting-board, bevelled on the top edge, is now fixed to the plugs, as shown in the section Fig. 7 and in the photograph Fig. 10. This board is coated with

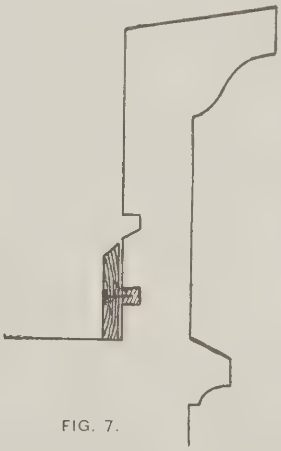


FIG. 7.

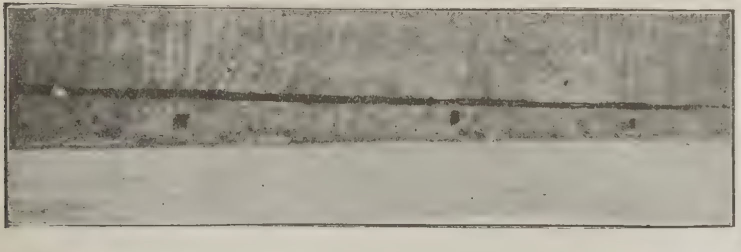


FIG. 8. CHASE AND PLUG HOLES.

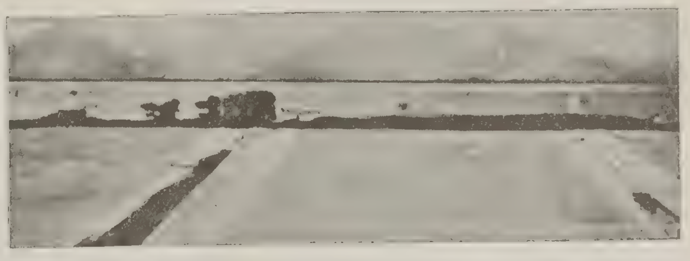


FIG. 10. THE SKIRTING BOARD FIXED.

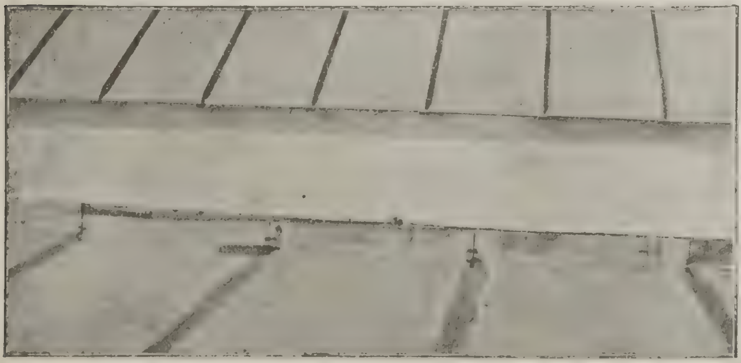


FIG. 9. FIRST OPERATION IN FORMING FLASHINGS.

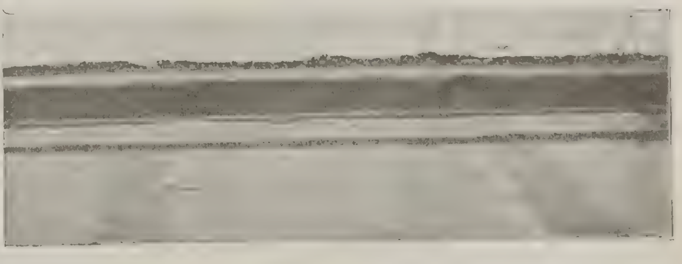


FIG. 11. THE FLASHINGS COMPLETED.

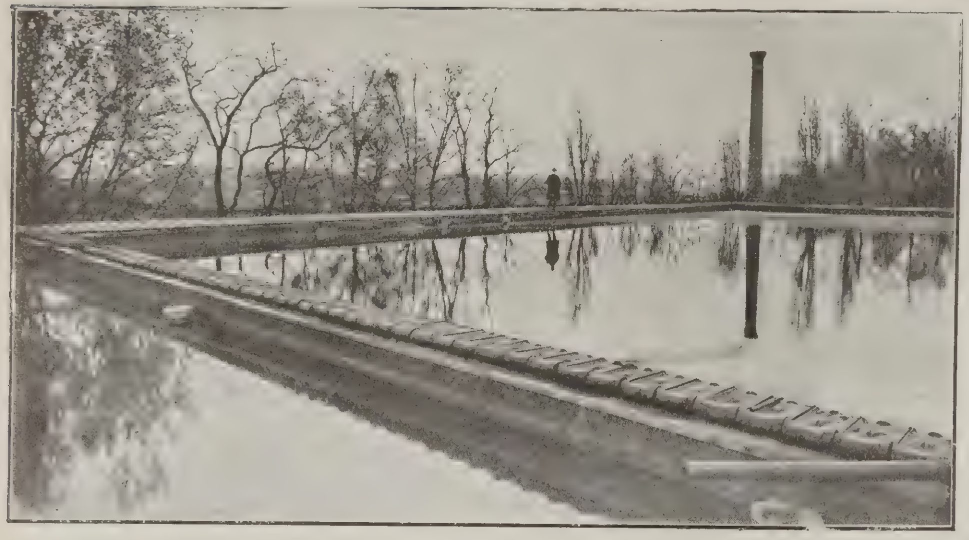


FIG. 12. TANK AT THE CUVELLIER COTTON MILL, LILLE, FRANCE.

"Ruberoid" cement to protect it from any possibility of decay. A narrow strip of "Ruberoid" is then tucked into the chase, turned down over the skirting-board and secured to the latter with nails, as shown in Fig. 11. Finally the chase is pointed with cement.

The chase and plug-holes were both alike moulded in the concrete from the first. The fillets to form the chase were nailed to the form-boards and removed with the latter, while the plugs were secured to the form-boards by double-pointed spikes, so that when the forms were knocked away the plugs were left in position. The chase was 1in. deep. The plugs were 1¼in. square and 3ins. long.

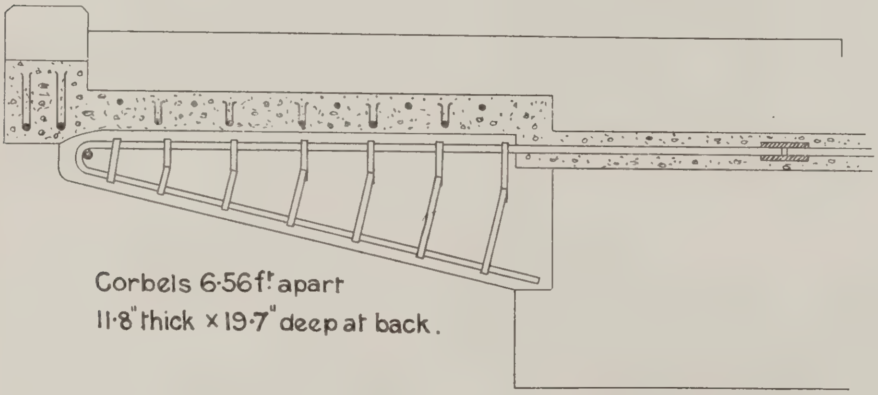
We referred above to the fact that "Ruberoid" does not contaminate rain-water. This has led to its employment for water-proofing roof tanks and reservoirs. As a matter of interest, we give, in Fig. 12, a view of a reservoir at the Cuvellier Cotton Mill, Lille, France, which is entirely water-proofed with the material, laid as described above, except that a double layer all over was not thought to be necessary (rightly so, as time has proved), a 6-in. strip giving a 3-in. lap being cemented under the joints of the sheets.

The Ruberoid Co., Ltd., of 81-83, Knightrider Street, Queen Victoria Street, London, E.C., also supply dampcourse made of the material and standard "Ruberoid" roofing for laying on boarded roofs. It is also used extensively for under-slating, and a "Ruberoid Flooring" is made in two colours—brown and dark grey.

WIDENING A BRIDGE.

The adaptability of reinforced concrete to difficult circumstances is well shown in the widening of La Boverie Bridge at Liége.

It was first decided to widen this bridge by means of stone brackets, cutting the ashlar of the bridge and pinning the brackets therein, but the engineer, M. Prangey, found that this cutting would destroy the keystones of the bridge.



LA BOUVERIE BRIDGE, LIEGE (147 YDS. LONG): METHOD OF WIDENING FROM 32.1 FT. TO 46.3 FT.

He, therefore, devised the following as a substitute. Brackets, as shown in the accompanying diagram, were constructed two months before being fixed, three rods 1·22in. diameter being "cast" in each bracket, the ends of rods projecting from the upper part being threaded to receive sleeves. These ends, projecting 3ft. from the bracket, were connected to rods carried across and under the road to similar rods on brackets at the other side of the road by sleeves as shown, the brackets being brought to its final level position by tightening or slackening the sleeves.

The brackets were put in two at a time by means of cranes, one on each side of the bridge, and after the brackets were in true position their ends were secured by running in cement grouting between them and the masonry.

The reinforced concrete slab forming the support for the causeway is 6ins. thick supported at intervals of 6·56ft. by the brackets.

The tie-bar across the road was embedded in concrete 6·3ins. thick.

The slab on the brackets was calculated to carry a distributed load of 80lbs. per sq. ft. and was tested up to 160lbs. per sq. ft. without any appreciable deflection.

A REINFORCED CONCRETE WAREHOUSE.

An interesting example of the Hennebique system of reinforced concrete construction has just been completed by Messrs. Holloway Bros. (Lnd.), Ltd., for the Associated Portland Cement Manufacturers, in the reconstruction of their warehouse, 143, Grosvenor Road, London, in accordance with designs prepared by Mr. H. O. Cresswell, F.R.I.B.A., architect, Mr. L. G. Mouchel being responsible for the design of the reinforced concrete work.

The work consisted of the construction of three floors and a flat roof, each 87ft. by 39ft., to replace one floor and roof originally constructed in steel and wood.

The floors were designed to carry a load of 4cwts. per sq. ft. They were only 6ins. thick, including 1in. of granolithic. These floors were supported on 12 columns 20ins.

THIRD FLOOR OF WAREHOUSES, 143 GROSVENOR ROAD, LONDON square in the 1st storey, 16ins. square in the 2nd, 12ins. square in the 3rd and 10ins. square in the 4th, with 15 main beams 14ins. deep by 8ins. wide by 17ft. long, and 56 secondary beams 9ins. deep by 5ins. wide by 10ft. long approximately in each floor.

The two lower lengths of columns were reinforced with nine round rods with links suitably spaced, whilst the next length had eight and the top length only four rods.

The ferro-concrete work was started on June 18th, and completed by September 14th, or a little under three months, the whole of the contract being finished in one month less than the specified time.

The illustrations are from photographs taken when the work was in progress, and the first photograph of the under-side of the fourth floor gives a good idea of the general construction.

Another view shows the centering of the floor and the main beams, also the system of strutting adopted for carrying the centering.

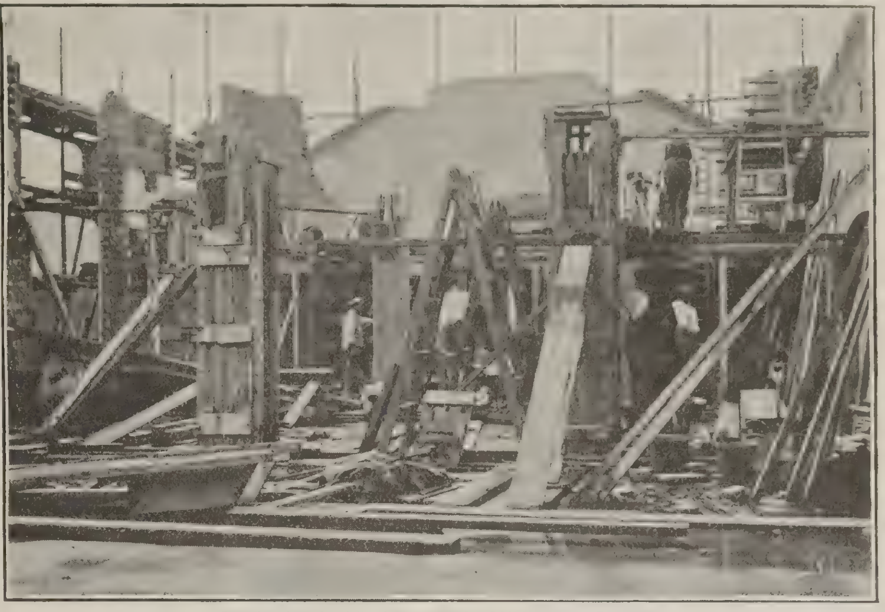
The view of the top of the centering completed shows the rods and stirrups in main and secondary beams being concreted round and part of the floor itself being finished off.

The fourth view shows the centering for the columns.

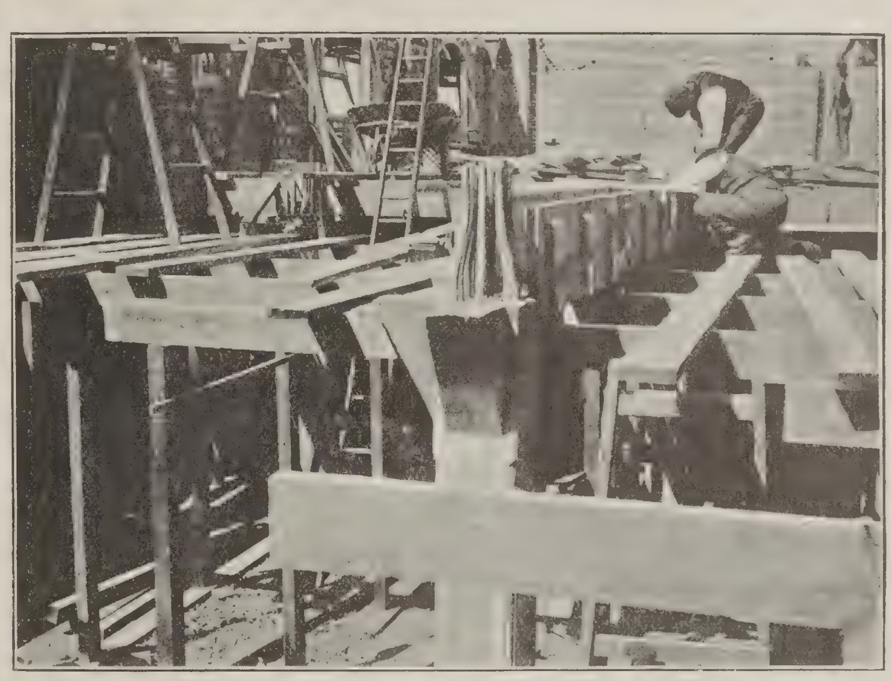
A test was made on each floor six weeks after each floor was finished, and in no case did the deflection of the main or secondary beams exceed $\frac{1}{2000}$ of the length of the span under the test load of 5cwts. per ft. super.

THE LITERATURE OF REINFORCED CONCRETE.

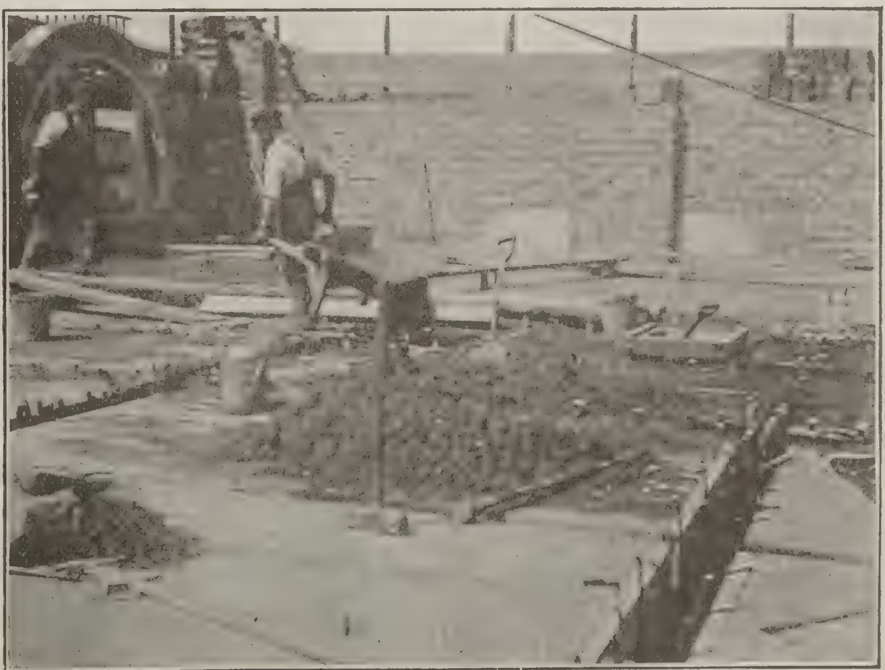
Two errors occurred in the article under this title published in our issue for December 5th. It was stated that M. Paul Christophe published his book in 1892. The date should have been 1902. A printer's error occurs in the seventh and eighth lines from the top of the second column on p. 95. The seventh line should read "length in our issue for July 30th, 1902," while the eighth should be "In 1904 Mr. L. J. Mensch, representative." To our statements in the article we would add that a theory of calculations for reinforced concrete beams is given in a catalogue of the Monier system, entitled, "Das System Monier," published in 1887 by G. A. Wayss, of Berlin, the lessee of the Monier patents for Germany and Austria, and to whose initiative the first practical and commercial adoption of reinforced concrete in building and engineering construction abroad was chiefly due. In this catalogue an abbreviation is given of Herr M. Koenen's theory, published in the "Centralblatt der Bauverwaltung" for January, 1886. Herr Koenen makes the assumption of the neutral axis in the centre of the beam, but apart from this his method has a striking resemblance to modern theory. Herr Koenen about this time joined Herr Wayss as the latter's engineer. Mr. F. G. Edwards's English patents, taken out in 1891 and 1892, should be referred to as antedating in many important features of reinforced concrete design numerous well-known patents. In Mr. Edwards's 1892 patent he gives a method for calculating the inclination of bent-up rods to resist the shear stresses in beams, with bending moment and shear diagrams. Further reference will be found to these patents on pp. 8, 9 and 10 of this issue.



CENTERING OF COLUMNS ON FIRST FLOOR.



CENTERING OF FLOOR SHOWING SYSTEM OF STRUTTING.



DECKING OF THIRD FLOOR COMPLETE: BEAMS IN COURSE OF CONSTRUCTION.

REINFORCED CONCRETE SYSTEMS.

Potter's and Edwards' Systems.

Messrs. Potter & Co., Ltd., through their managing director, Mr. Thomas Potter, can claim to be one of the very oldest specialists in reinforced concrete construction, and indeed in the use of concrete in every form. Mr. Thomas Potter was firstly, for about 25 years, clerk of works on Lord Ashburton's estates. He early began to use concrete owing to the fact that on this nobleman's estates in the West of England no sand or bricks were to be obtained within 20 miles. It was just after the time of Tall, a bricklayer, who had about 1865 brought the use of monolithic cement-concrete walls into prominence by the introduction of movable centering or forms, and by his having received a commission from the Emperor of the French to build several concrete cottages at the Paris Exhibition, that Lord Ashburton determined to solve the difficulties existing on his estate by going in for concrete buildings. A complete and somewhat elaborate plant, embodying a steam crusher and mixer were installed, and Mr. Potter carried out a great quantity of concrete work. Fig. 1 shows a farmhouse and cheese factory erected by him on Lord Ashburton's estate in North Wiltshire at All Cannings, near Devizes, in 1871. The walls are of Portland cement-concrete made with slag aggregate from Seend Ironworks; the floors of the cheese factory are also of concrete, but not the farmhouse floors.

Mr. Potter's Book.

In 1877 Mr. Potter published the first edition of his well-known and widely-appreciated book "Concrete: Its use in Building." This was re-written and published as two volumes in 1891. In this latter second edition Mr. Potter deals at some length with the use of iron for reinforcing concrete and remarks upon the necessity of securing the ends of the rods to prevent them slipping by the insufficient adhesion.

Mr. Potter states that he used to insert hoop-iron in concrete to reinforce it more than 30 years ago. He found this had one effect not anticipated—namely, that it helped to remedy the effects of contraction and expansion from changes of temperature.

Fire-resisting Floors.

Thirteen years ago—namely, in 1893—Mr. Thomas Potter started in business for himself as Potter & Co., Ltd. From this period dates his extensive practice in the construction of fire-resisting concrete floors. Mr. Potter early introduced the form of floor shown in Figs. 2 and 3. The underside of the joists is protected from fire by the fireclay shield-pieces and the plastering on expanded metal lathing. This is a very economical form of floor and can be carried out with great facility and speed, owing to freedom from obstruction by supports for removable centering, owing to the use of the permanent fixed centering consisting of curved corrugated iron sheets. The way in which these floors are built is well seen in the photographic view, Fig. 4, which shows floors at the Colinton Fever Hospital, near Edinburgh, opened by the King in 1894 and stated to be the largest fever hospital in Great Britain. An immense area of floors was there carried out by Messrs. Potter & Co., principally in coke-breeze concrete, with suspended ceilings. In connection with this particular contract we have an interesting and important fact to relate. It is often stated by those without much experience of concrete that the material expands, and that failures occur from this cause. In fact, it used to be a common clause in architects' specifications that a space was to be left round the walls where the concrete floors abutted to allow for expansion. The idea is, however, erroneous. There are any number of examples to point to as proof that no such expansion occurs, but probably the following extract from a letter written to Mr. Potter on May 2nd, 1903, by Mr. George Ballinghall, clerk of works on this Colinton Mains Hospital, will be thought conclusive by most persons :—"I have never found any expansion of your concrete floors on any of the buildings, although several of our floors here have been done over four years. A number of our pavilions are 120ft. long and 26ft. span, without any break or division wall, the ground floor being 5ft. high and the upper floor 14ft. above the ground floor. Had there been any expansion whatever it must have shown long before now."

The Edwards Patent.

Messrs. Potter & Co. worked the patents taken out by Mr. F. G. Edwards in 1891 and 1892. Mr. Edwards' first patent, dated February 18th, referred to reinforced concrete lintels, and he had a number of experiments made by Messrs. David Kirkcaldy & Son on April 28th, 1891, which were reported in "Engineering" and the "Builder" for May 1st and 2nd respectively. The complete specification filed by Mr. Edwards gives the results of these tests with a number of diagrams, from which we select a few—namely, Figs. 5—8. We extract the following particulars from his specification :—

"This invention consists of improvements in the methods of combining iron or steel with concrete for the purpose of resisting the tensile stresses (and in some cases the compressive stresses also) in concrete floors, roofs, partitions, beams, girders and other structures.

"It has long been proposed to combine iron bars with the concrete by simply embedding them, but they have been found to slip when the stress has been brought upon them. I have discovered that by making the bars long in proportion to their sectional area a point can be reached at which the bars will fail by tearing before they can be drawn out of the concrete, and that this combination can be made to serve some useful purposes. This constitutes the first part of my invention.

"Sufficient holding surface can always be obtained for the required quantity of iron, for while the sectional area of a rod varies as the square of the diameter, the surface exposed for the adhesion of the concrete varies only as the diameter. For instance : two $\frac{1}{4}''$ rods, although only one half the sectional area of one $\frac{1}{2}''$ rod, have exactly the same amount of surface for the adhesion of the concrete.

"The large deflection of the composite beams should also be noticed, as this shows they are capable of withstanding suddenly applied loads. Their flexibility also adapts them for railway sleepers : they would not form a hard and unyielding base for traffic at high speeds like the stone blocks used at an early period in the history of railways.

"Steel may be economically used in place of the iron, as its high tensile strength is not weakened by forgings or bolt holes. I prefer round rods or wires for embedding in the concrete but stranded wire or bars of other section may be used.

With concrete composed as described the cement works itself around the iron rods and they become embedded in neat cement, whereby they are better protected from the atmosphere, and larger sized rods can be held by the concrete. In other cases the rods may be laid in neat cement or smaller rods used.

"The joists and partition studs previously described are intended to be used in a somewhat similar manner to timber, being placed, say, twelve inches apart and the floor boards or lathing nailed to them. Small nailing fillets may be inserted in the under-side of the joists. Rafters and other beams may be constructed in a similar manner; and it is also evident that the beams may be moulded in a segmental or other curved form where required.

"The flanged joists (Fig. 5) may have coke-breeze concrete filled in between to

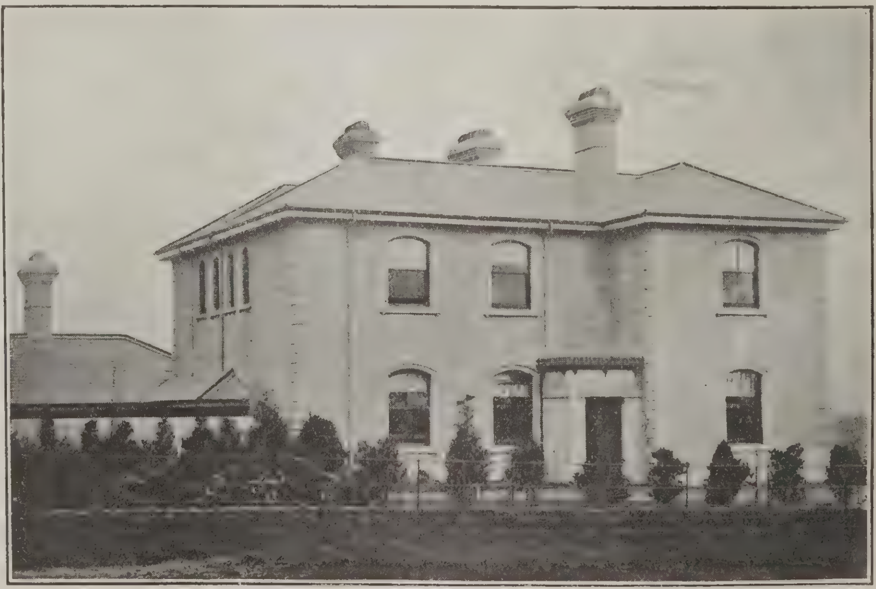


FIG. 1. CONCRETE FARMHOUSE AND CHEESE FACTORY, NEAR DEVIZES, BUILT IN 1871.

form a solid floor. The nailing fillet *b* is not then required.

"Fig. 8 shows a method of framing horizontal members into the corner post of a structure. The horizontal members are housed in and their rods *a* pass through holes in the post where the ends are secured by screwed nuts *f* resting on bearing plates *g*. The sinkings *h* may be afterwards filled up with cement. This joint is also applicable for other purposes. Buildings or parts of buildings may be cheaply constructed of concrete and iron beams framed together in this manner. The panels may be filled in with concrete, or the framing may be lathed and plastered on both sides, or the outside may be hung with tiles.

"A window sill is strengthened by wires *a* embedded both at the top and bottom. This is especially applicable for sills of long lengths. Window heads may also be strengthened in this manner or after the manner of the lintel (Fig. 7)."

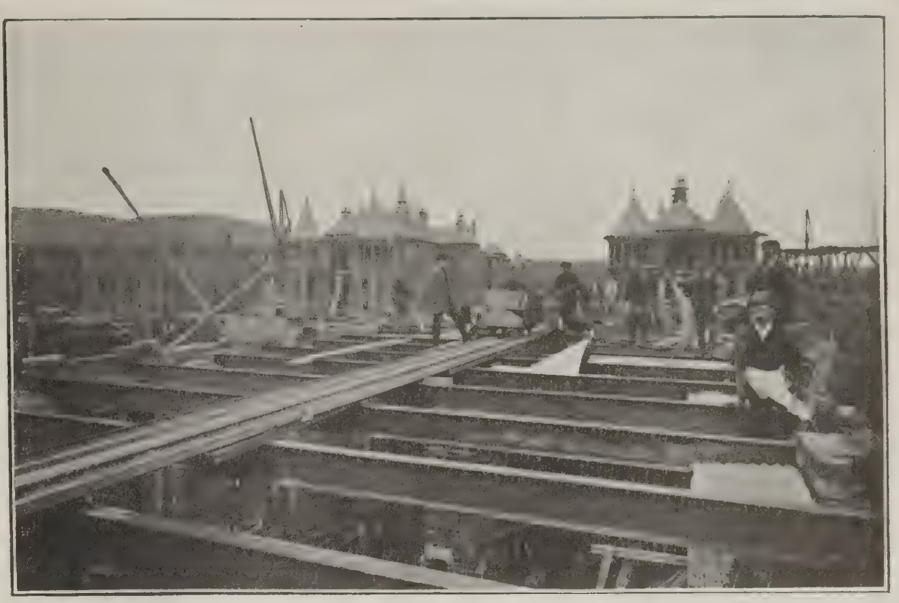


FIG. 4. FLOORS IN COURSE OF CONSTRUCTION AT COLINTON MAINS HOSPITAL, EDINBURGH.

The second Edwards patent, dated January 25th, 1892, was an improvement on the first, and we reproduce several illustrations—namely, Figs. 9 and 10, and select the following particulars from the specification :—

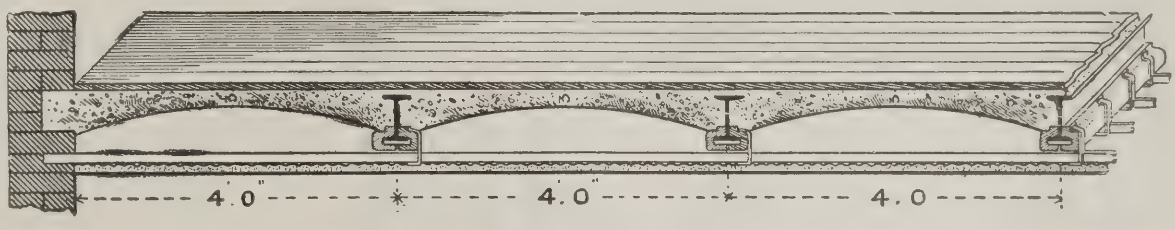


FIG. 2. FLOORS WITH PERMANENT CORRUGATED-IRON CENTERING.

"Heretofore it has been necessary when these concrete-and-iron beams have to be built into walls and other structures to curve the rods upwards at the ends *a* (Fig. 9) to resist the tensile stresses due to fixing. I now prevent the ends being fixed by forming them of a quadrantal shape over the bearings, the quadrant being struck from the intersection *b* (Fig. 10) of the under-side of the beam with the inner side of the bearing. The extra strength and stiffness due to fixing are thereby lost, but the construction is simplified and the beams can be built into walls with a length of bearing not exceeding their depth. Although a quadrantal end is described as the best form, a differently curved or an inclined end may sometimes be used.

"I also improve the arrangement of the rods in deep beams where two or more series are used one above the other, as shown by Fig. 10, by bending the second series of rods B downwards between the spaces of those in the first series A at the centre of the beam where the tensile stresses are greatest. The tensile strength of the second series of rods is thus used to greater advantage, while the resistance of the beam to horizontal shearing is not materially reduced. A third series of rods C may be bent downwards at the centre to lie on top of the first and second series. This arrangement is more suitable for beams not fixed at the ends—that is to say, in beams where the position of the greatest direct stresses does not correspond with that of the greatest shearing stresses. In other cases, where the positions of the greatest direct and shearing stresses coincide, the second series of rods would be brought closer to the first series at those points, as is the case with the rods A and B in Fig. 9.

"In concrete-and-iron beams supported at the ends with uniformly distributed loads the intensity of the shearing stresses at the ends of the rods (when embedded horizontally) is greater than with a corresponding central load and would be double were it not that the concrete towards the ends of the beams relieves the rods of a portion of their tensile stresses. Should the rods draw out at one end the concrete would be exposed to undue tension and the beams would break at some point not far from the bearing. The total amount of shearing stress along the whole length of the rods is about the same however the load is applied, and I have now discovered that by simply curving the rods upwards at the ends the shearing stresses due to a uniformly distributed load may be more uniformly distributed over the length of the rods, while at the same time the inclining of the rods increases their hold on the concrete.

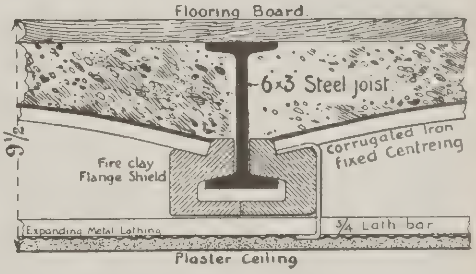


FIG 3. DETAIL OF FIG. 2.

"One effect of curving the rods upwards at the ends is to leave a greater proportion of the tensile stresses to be resisted by the concrete, making it necessary to embed horizontal rods also. When horizontal rods are combined with the curved rods the shearing stresses on the surfaces of the former are rather concentrated towards the ends and these may be secured by corrugating them for, say, one-fourth of their length at each end, the corrugations preferably increasing in depth at the extreme ends, as shown at the ends of the rods A (Fig. 10). I found by experimenting with wires of $\frac{1}{18}''$ diameter that small corrugations were sufficient to more than quadruple the hold on the concrete. Rivet heads or collars of sufficient size formed at or near the ends of the rods would evidently answer the same purpose.

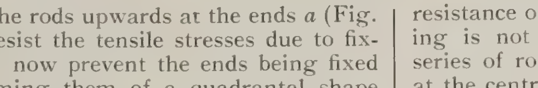


FIG 7

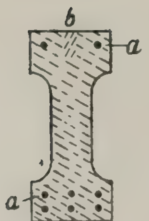


FIG. 5.

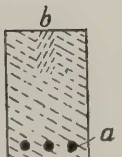


FIG. 6.

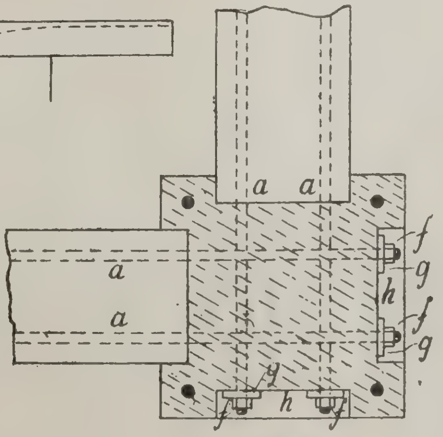
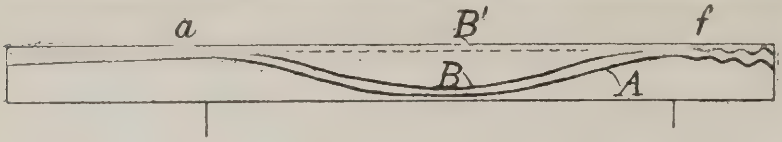


FIG. 8.



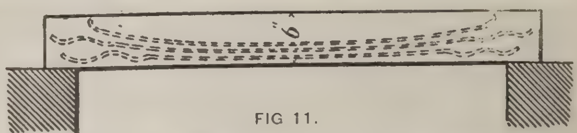


FIG 11.

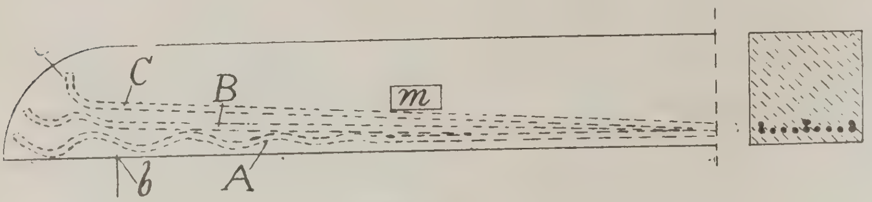


FIG 10. EDWARDS'S 1892 PATENT.

"The curved rods may also be corrugated if considered desirable. The corrugations tend to increase the resistance of the beam to horizontal shearing and the ends of some of the rods may be bent upwards, as shown at *e* (Fig. 10) for the same purpose. The latter may be useful in the case of heavy loads concentrated near the ends of the beam. In fixed beams the ends *f* (Fig. 9) of the rods which are curved upwards may be corrugated with the corrugations preferably increasing in depth at the extreme ends, to reduce the necessary length of bearing. When the load is to be distributed the upper series of rods B may remain at the top of the beam, as shown at B^1. Cantilevers would have the rods embedded at the top and these may be similarly corrugated at the fixed end of the beam.

"For relatively large spans, say 24 times the depth, the rods would all be horizontal, but for short spans to carry correspondingly heavy loads each alternate rod may be curved upwards and the others corrugated at the ends as previously described. The latter arrangement besides giving the rods a more secure hold also increases the resistance of the beams to horizontal shearing."

It will be gathered from this that Mr. Edwards was a pioneer in reinforced concrete construction and had thus early (previous, indeed, to the invention of the more famous foreign systems) fully grasped almost all the principles of reinforced concrete construction. He inclines his rods to the top at the point of contraflexure when beams or floors have fixed ends or are continuous; shear is resisted by bending up the rods; and finally mechanical bond, in order to secure greater adhesion and resist sliding, is given to the rods by corrugating them, or twisting the ends. Messrs. Potter & Co. in their practice have improved upon this by corrugating the rods their entire length.

Mr. Edwards' patents had chief reference to the construction of lintels. A test on two lintels of the most improved form, as referred to in the 1892 patent, was made by Messrs. Potter & Co. and is illustrated in Figs. 11 and 12. These were taken from stock.

The distance between supports was 4½ft., and the distributed load—the lintels remaining unbroken and the deflection one-eighth of an inch only—was 20 tons. The width of each lintel was 4½ins. One of the lintels tested, afterwards broke with a centre load of 6½ tons, caused by elongation of the steel rods.

A floor reinforced with corrugated steel rods adopted by Messrs. Potter is shown in Fig. 13. Such a form is used in all the floors of the Central Fire Station and some of the floors of the Fever Hospital, Edinburgh, among other important buildings.

Fig. 14 shows a reinforced concrete floor with continuous corrugated rod reinforcement, permanent galvanised corrugated centering and suspended ceiling, and is practically a combination of the types shown in Fig. 8 and Fig. 13. The double floor, of course, is much more sound-resisting than the single concrete floor.

Messrs. Potter & Co. prefer corrugated rods to the metal mesh system for floors, as by adjusting the distances apart of the rods, more or less strength can be obtained as may be required. When the unsupported area to be covered is much greater one way than the other, Messrs. Potter find it advisable to use rods across the narrow way only, instead of transversely. The same weight of reinforcement applied in this way gives better results than if the rods are fixed in both directions, crossing each other.

At new buildings in Rathbone Place to be used as showrooms the unsupported areas were mostly 17ft. by 10½ft. centre to centre of steel joists and 5ins. in thickness.

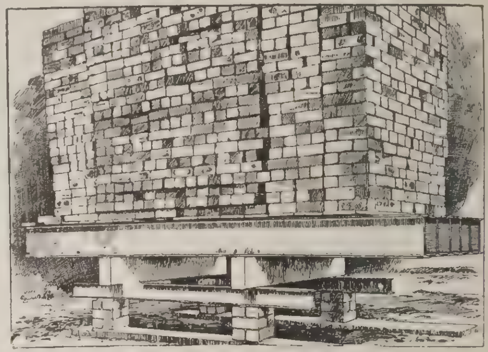


FIG 12. TEST ON LINTELS.

Perhaps the largest unsupported area for a floor 5ins. in thickness was made by Messrs. Potter lately, with a view of ascertaining the resistance of rods to tension. The test was described and illustrated in our issues for November 7th and December 5th. Obviously no such large dimensions would be advisable in a general way.

Messrs. Potter make a speciality of reinforced concrete work of all kinds, such as roofs, domes, stairs, theatre steppings, reservoirs and general concrete work. They won the £100 prize for the cheapest concrete cottage at the Cheap Cottages Exhibition held in 1905 at Letchworth, the first garden city.

The following is a list of the more important buildings in which reinforced concrete floors, roofs, &c., have been executed by Messrs. Potter & Co., Ltd.:—

The Salisbury Infirmary; Edinburgh Fever Hospital (largest in Great Britain); Devon and Exeter Hospital; Langham Mansions, Earl's Court; Earl Rosebery's mansion, Berkeley Square; Douglas Mansions, Kensington; Salisbury Union; Ripon Union; House for Lord Rothschild, Tring; Goring Brewery; Ruffel's Brewery, Bexley; Simond's Brewery, Reading; Dartford Brewery Co.; Farnham United Breweries; Post Office, Yeovil; Bacon Factory, Yeovil; Ebor Confectionery Works, York; Offices, Albany Buildings, Victoria Street; Pantechnicon, Reading; Temperance Hall, Reading; London and County Bank, Reading; Capital and Counties Bank, Yeovil; Lloyd's Bank, Oxford; Berks Asylum, Moulsford; Stables, Maidenhead; Broadway Livery Stables, Westminster; Orphan Home, Shefford; Junior Army and Navy Stores, St. James' Street; Residential flats, Bexhill-on-Sea—Jermyn Street—North Audley Street, &c.; Mansion, Oundle, for Hon. Walter Rothschild; Lying-in-Hospital, Betterton Street, London; Convent of Poor Clare, Arundel; Board School, Thornton Heath; Central Fire Station, Edinburgh; Electricity Works, Reading; Electricity Works, Leatherhead; Flax Factory, Crewkerne; School, Builth; Mansion, Crewkerne; Post Office, Yeovil; Mint extension, London; Schools, Yeovil; Mansion for Lord Digby, Minterne, Sherborne; Lace curtain factory, Chard; St. Thomas's Hospital, &c., &c.

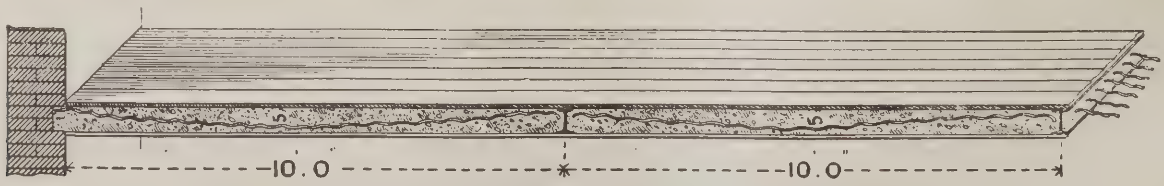
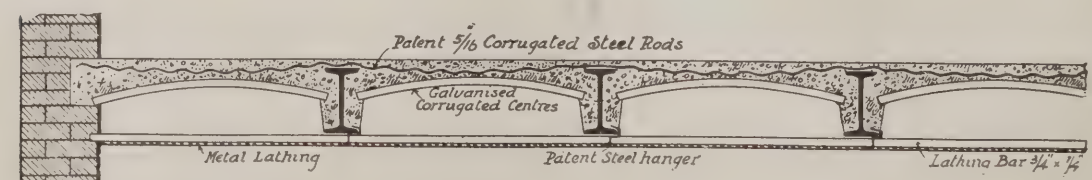


FIG. 13. FLOOR REINFORCED WITH CORRUGATED RODS.


Patent 5/16 Corrugated Steel Rods
Galvanised Corrugated Centres
Metal Lathing
Patent Steel hanger
Lathing Bar 3/4" x 1/4"
FIG. 14. COMBINATION OF TYPES SHOWN IN FIGS. 3 AND 13.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
January 30, 1907.
CONCRETE AND STEEL SUPPLEMENT (MONTHLY).

A REINFORCED CONCRETE OFFICE BUILDING.

We publish in this issue some photographs and detail drawings of a tall office building in Hope Street, Glasgow, constructed of reinforced concrete on the Hennebique system by the Yorkshire Hennebique Contracting Co., Ltd. The architects were Messrs. Salmon and Son and Gillespie, of Glasgow, and the engineer responsible for the design of the reinforced concrete was Mr. L. G. Mouchel.

The site measures 46ft. 1in. by 33ft. 1in., bounded on the south by existing buildings, and on the east by a boundary wall; on the north side there is a narrow cart service lane, 3ft. of which was permitted to be enclosed, but during operations this lane had to be kept open for cart traffic: on the west the site fronts to Hope Street, and 6ft. of this street was enclosed.

It will thus be seen that the area available for conducting operations was very limited, and the difficulties arising from this were increased by the great height of the structure, which is approximately 90ft. from pavement level, and 100ft. from basement level.

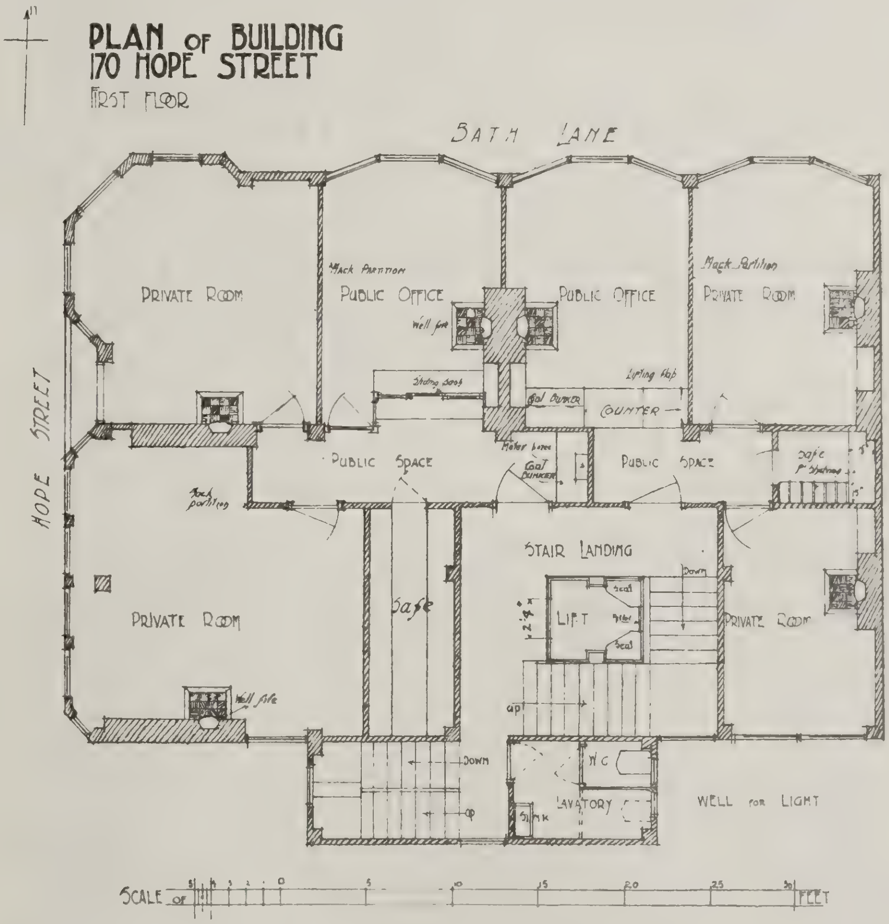
Owing to this restricted area the contractors did not employ any power hoisting gear, all materials being hoisted by hand labour. For the same reason no outside scaffolding built from the ground was used, the structure being constructed from within and carried up as far as possible in a solid and monolithic manner: that is to say, each floor was laid and completed before the walls of the next storey were commenced. This enabled flying scaffolds to be cantilevered off each floor as required for outside work, and it also enabled an outside scaffold to be dispensed with—an important consideration in a congested city area.

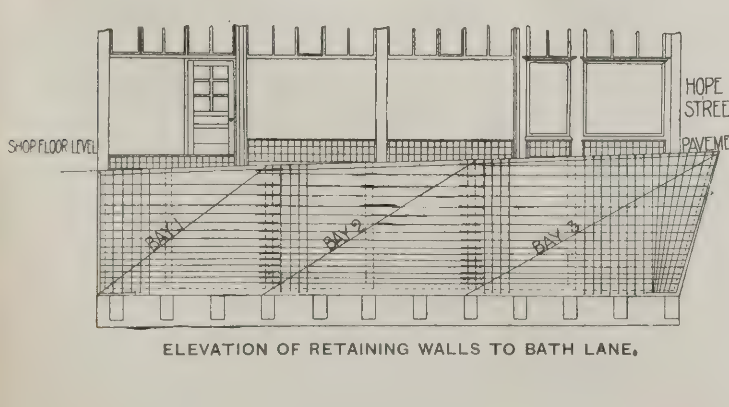
The centering was of the usual type adopted for Hennebique work, and calls for no special remark, excepting that for the octagonal cupola on the roof. This was formed by uprights cut accurately to the contour required. Short horizontal boards were then nailed between each pair of uprights, thus following the contour. A countermould was also made for the outside, but in this case the timbering was brought up only slightly in advance of the process of concreting, so as to permit the thorough compacting of the concrete. The intrados of this cupola had to be carefully and accurately formed, as the cupola is open to view from beneath.

The cornices, strings, and other run moulds were formed by timbering, and, after removal of the timbering, were accurately trued by the use of templates. The other architectural enrichments, such as medallions, keystone and busts (which last appear at fourth-floor level), were formed by means of strong plaster moulds reinforced with steel. The heavier of these enrichments were cast beforehand and afterwards fixed in place.

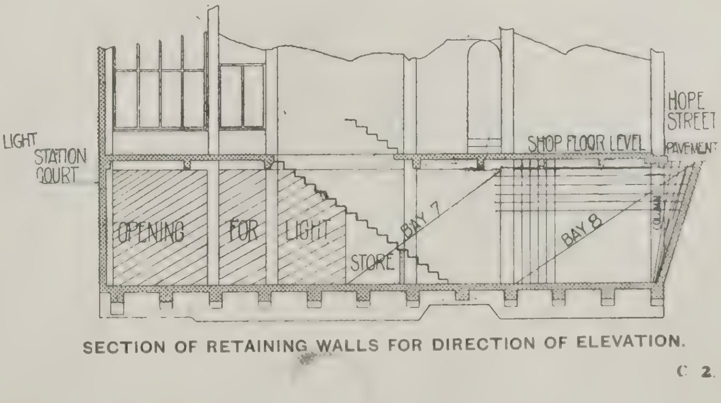
The frontages were finished after completion by being rendered with cement mortar, special care being taken to get a good uniform and smooth surface on the principal frontage to Hope Street.

The roof is entirely constructed of reinforced concrete, and the concrete has been covered with a bituminous material to ensure water-tightness, with the exception of the cupola and the steep-pitched portions of the roof, which were simply rendered on the exterior with cement mortar, and have since proved water-tight.

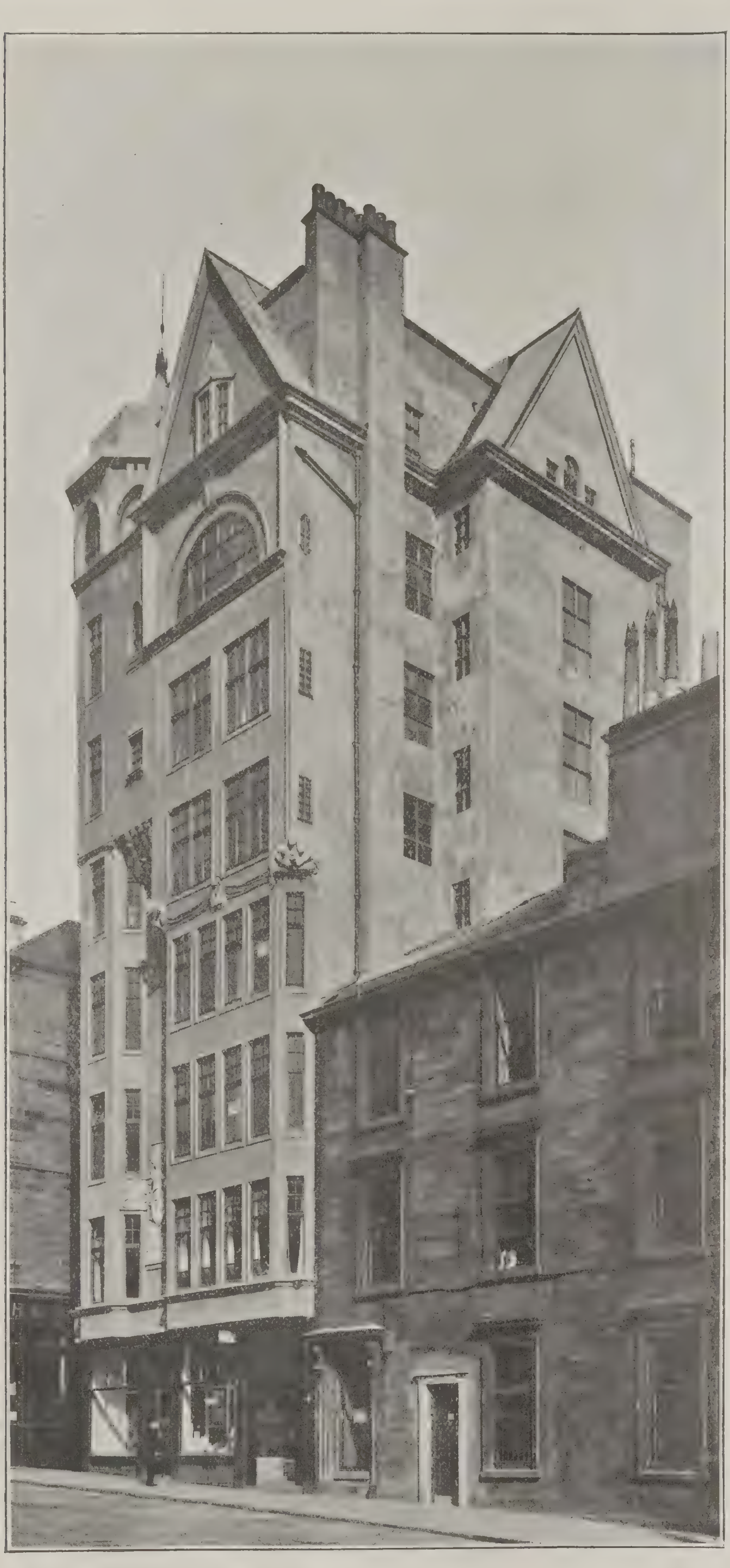




ELEVATION OF RETAINING WALLS TO BATH LANE.



SECTION OF RETAINING WALLS FOR DIRECTION OF ELEVATION.



"LION CHAMBERS,"
NO. 170 HOPE STREET, GLASGOW,
SALMON AND SONS AND GILLESPIE, ARCHITECTS.

The mixing of the concrete was entirely done by hand, the limited area of the site prohibiting the laying down of power plant. The proportions employed for the concrete were those always adopted for Hennebique work. The aggregate used for the concrete was broken whin. A close-grained and very hard concrete was obtained.

Not the least interesting feature of the building is the foundation. The ground at the site was found to be good hard boulder clay, but in consideration of the great height of the building and the small relative area of the site, it was decided to construct a foundation consisting of a general sill spreading the loads brought by the columns equally over the whole area of the site. By this means the foundation was given the largest base possible. The general sill or raft was formed by a series of very strong primary and secondary reinforced concrete beams combined with the sill, and from which the columns spring.

As regards the architecture, Messrs. Salmon and Son and Gillespie explain that the material and the purposes of the building suggested the treatment. No effort was made to imitate a stone or brick building, but as ample daylight in offices is of high importance in a city, large and projected windows were made the predominant features. The corner oriel window has been carried above the roof and finished with a dome, which has been made an internal feature of one of the studios on the top floor. Two modelled corbels, representing legal dignitaries, help to support the main oriel window. The name of the building, "Lion Chambers," is given on a modelled panel, surmounted by the coat of arms and motto of the proprietor, which is intended to be painted in heraldic colours.

The ground and basement floors are occupied by a firm of stationers and printers, the upper offices are chiefly tenanted by lawyers, and the top floors are occupied by artist painters.

The outer walls and floors are 4ins. thick. Had the walls been of the thickness prescribed in the Building Act, the offices would have been too small for useful occupation. The area of the site is 1,578 sq. ft., and after deducting the space occupied by outer walls, lobbies, stairs and lift, the lettable area of the nine floors of shops and offices is 11,070 sq. ft.

The following were the contractors for the work (of Glasgow, where not otherwise stated) :—

Reinforced Concrete Work, Yorkshire Hennebique Contracting Co., Ltd., Leeds.
Joiner Work, Geo. Laird & Son.
Plumber Work, Steel & Wilson.
Plaster Work, J. & J. Bottomley, Marsden.
Painter Work, Thomas Laurie & Co.
"*Mack*" *Partitions*, Stuart's Granolithic Stone Co.
Bitumastic Enamel on Roof, Wailes, Dove & Co., Newcastle-on-Tyne.
Tile and Marble Work, Galbraith & Winton.
Heating Apparatus, Messrs. Combe & Son.
Electric Elevator and Enclosures, A. & P. Steven.
Electric Lighting, Claud Hamilton, Ltd.
Lightning Conductor, Wm. Harvie & Co., Ltd.
Grates, Well Fire Co., Ltd.
Stoves, Carron Co.
Figure Sculpture Work, Johan Keller.
Modelled Ornament, Geo. Gregory.
Wrought-Iron Work, Geo. Adam & Son.
Pavement Lights, Hayward Bros. & Eckstein, Ltd.
Safe Doors, Donald Clerk & Son, Ltd.
Ironmongery, J. L. Macindoe & Co.

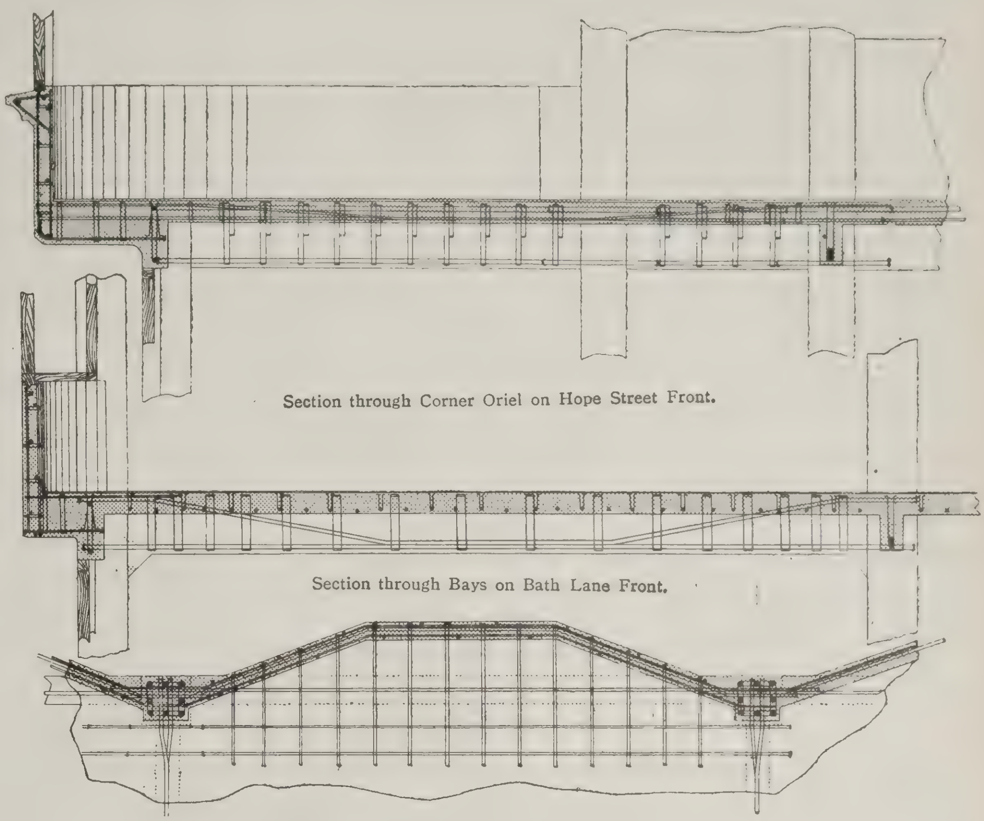
Messrs. J. E. Sayers and Caldwell were the consulting electricians, and Mr. Alex. McLay was the clerk of works.

Views and Reviews.

Reinforced Concrete.

Upon the publication of the first edition of this work we expressed the opinion that it was entitled to rank as the standard book on reinforced concrete in the English language. We still adhere to that opinion. The two years that have expired since the publication of the first edition have brought forth several books, but none of these are equal in general value, although undoubtedly they are valuable in certain directions. Although this is the third edition of the book, it is revised for the first time by the authors.

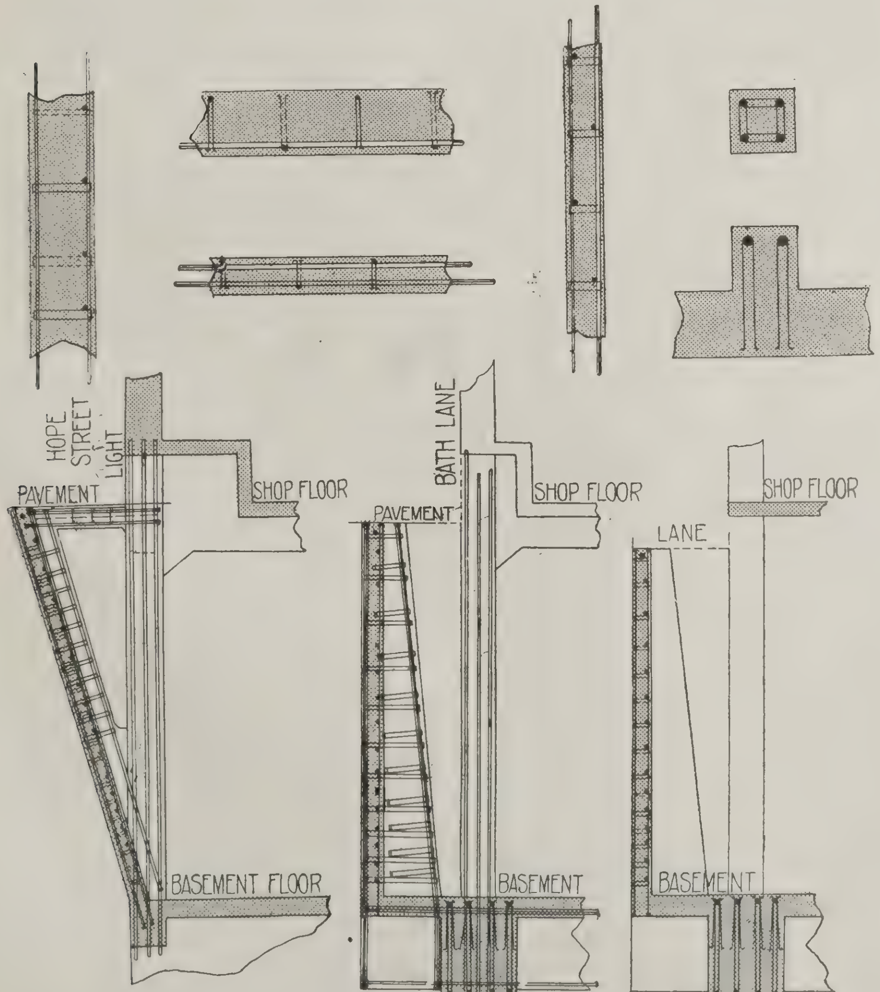
When the edition appeared in 1904 little was known about the subject by the architectural and engineering professions, and certainly very little interest was taken in it. France, Germany and America, as everyone knows, have made very great strides in the use of the material and the foundation of an adequate theory, and it was to a French work that Mr. Marsh went for the basis of his book. That is to say, the first edition was largely founded upon and translated from M. Paul Christophe's "Le Béton Armé," the author of which is engineer to the Belgian Government Department of Ponts et Chausées. Mr. Marsh followed the plan of M. Christophe's book in his treatment of the subject, but he added a good deal of original investigation in the way of calculations for design, together with descriptions of special systems, English and American, which M. Christophe apparently was not aware of or omitted because they were not particularly well-known on the Continent.


Section through Corner Oriel on Hope Street Front.

Section through Bays on Bath Lane Front.

Plan of Bay Windows on Bath Lane Front.

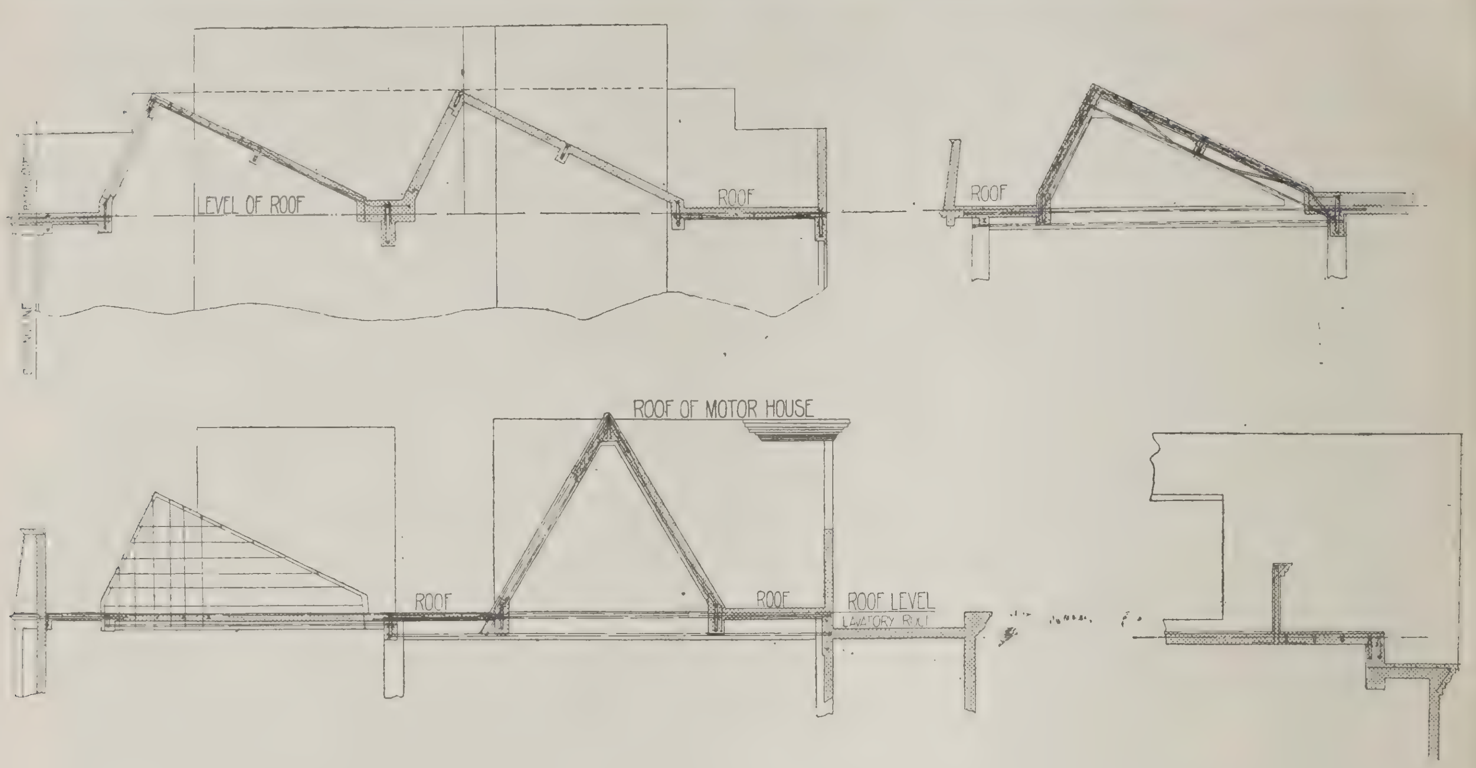
FIRST FLOOR DETAILS OF "LION CHAMBERS," No. 170, HOPE STREET, GLASGOW.



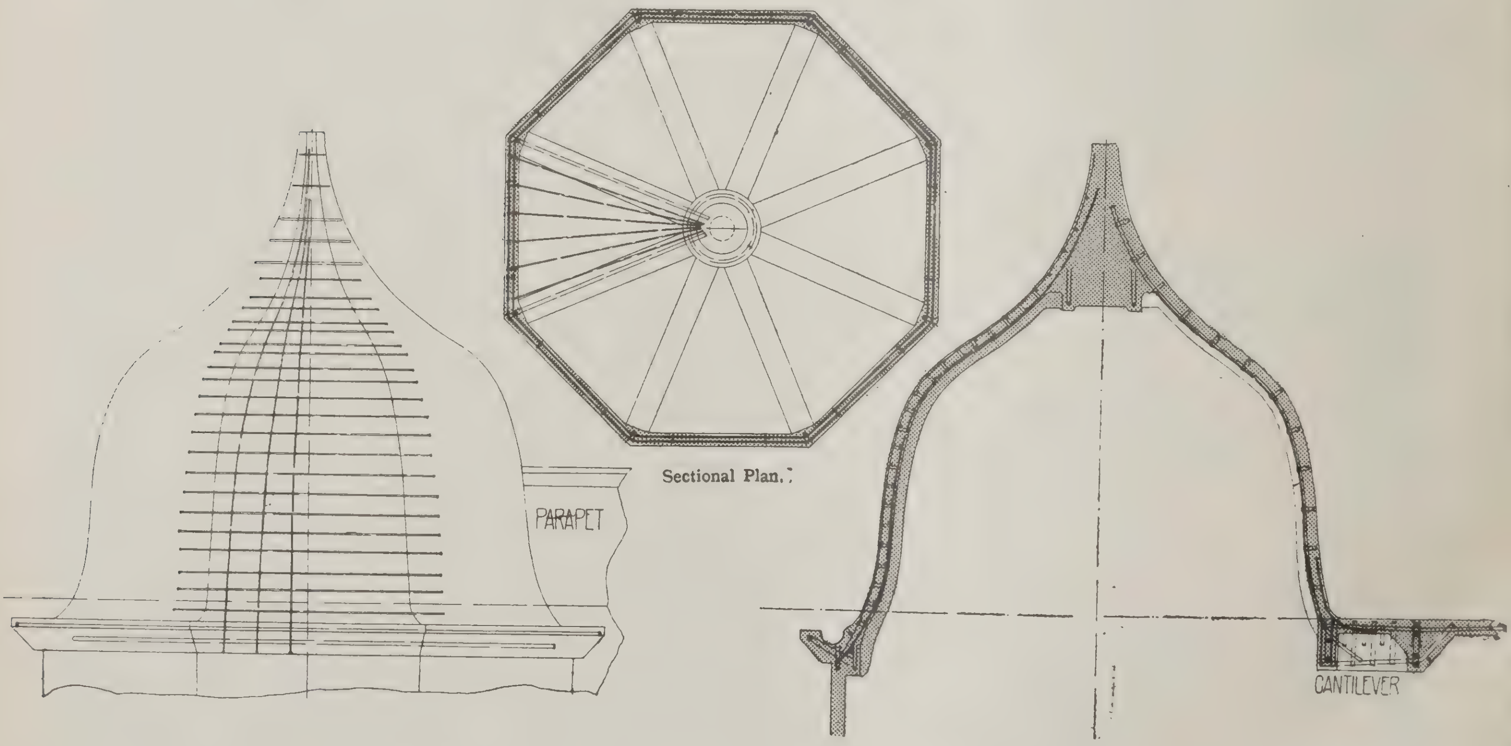
DETAILS OF RETAINING WALLS, "LION CHAMBERS," No. 170, HOPE STREET, GLASGOW.

Since the first edition the subject has made further great strides abroad, its popularity in this country has increased enormously, and Mr. Marsh has learned a good deal. The result is that the book now differs considerably from the first edition. Much general information has been added, together with descriptions of different systems, some of which are new and others have lately come into prominence. The division of the work upon the subject of experimental research and data and calculations for strength of concrete members bears very little semblance to its former self. It has been almost entirely re-written and many new diagrams are included. Mr. William Dunn, who gave Mr. Marsh considerable assistance in the preparation of the first edition has again aided him in the present revision, and has been included as joint author. Regarding the share of each author in the preparation of this edition we may quote from the preface: "It was unavoidable that most of the work of revision and enlargement should fall on Mr. Marsh, but it is hoped that the work has been considerably improved by the valuable suggestions and some contributions to the text in the form of letterpress and diagrams which have been made by Mr. Dunn."

Dealing specifically with the various portions of the book, we come first to a general review of the subject. This starts with a short history of the development of reinforced concrete. Mr. Marsh refers to a patent having been taken out in 1854, but he does not mention the name of the



SECTIONS SHOWING DETAILS OF ROOF CONSTRUCTION—"LION CHAMBERS," No. 170, HOPE STREET, GLASGOW.



Hope Street Elevation.

Sectional Plan.

Section.

TOWER ROOF, "LION CHAMBERS," No. 170, HOPE STREET, GLASGOW.

inventor—namely, W. B. Wilkinson. He seems ready to admit without dispute the claim of foreign authors that the evolution of modern reinforced concrete was entirely attributable to Continental inventors, perhaps because he follows M. Christophe so closely. He dates the modern development of reinforced concrete to Joseph Monier, a French gardener. It should be remembered, however, that Wilkinson had done a good deal of work with his systems in and around Newcastle-on-Tyne long before Monier ever made his first flower-pot of wire and cement, while Brannon (whose offices were in London), between 1870-5, if not later, was using reinforced concrete. It was not till 1873-5 that Monier began to see its possibilities for use in engineering and building works, but Hyatt in about 1875 had elicited all the principles of reinforced concrete and published an exhaustive book on the subject, and Ransome and Golding in America and Stuart and Dennett in England had done considerable work in which reinforcement was used for concrete floors before it could be said that Monier had really grasped the fundamental principles of its employment in building construction. The enterprise of Wayss, who bought Monier's German patents, resulted in bringing the use of reinforced concrete prominently before Continental engineers, and the subject grew in importance between about 1885 and 1890. Edwards in this country and Hennebique in Belgium improved the design of beams and were followed by Coignet and other

French inventors. The engineers in France and Germany then began to study the theory of calculations for the work, and undoubtedly to them must be assigned the credit of first placing the subject on a thoroughly scientific basis, but in the last two or three years most important experimental work has been done in the United States, and it looks as though Continental architects and engineers should be rapidly outdistanced in the use and understanding of reinforced concrete by England, the Colonies and the United States. We really feel that, in view of these facts, Messrs. Marsh and Dunn deal with the history of the subject in a most inadequate manner. How much the French pioneers owe to their forerunners in England and America will never be known. We think it is highly probable that they must have become aware—in some circuitous manner perhaps—of the work of Wilkinson and Hyatt particularly. In regard to the latter, there was no particular secret as to his efforts and experiments. He published a book—privately it is true, but which was reviewed in the English press at the time—in which he placed on record all his ideas regarding the subject, and the results of tests by Kirkcaldy. No doubt practical work such as Monier was doing would lead to the independent discovery of some of the principles, but Monier's work was considerably different in detail, and when the chief movement took place subsequently the similarity in detail to former work in this country and in America was too close for us to readily admit independent and original invention.

The authors, in their introduction, then go on to deal with building regulations governing the use of reinforced concrete and the advantages and disadvantages of this system of construction with its resistance to the weather and freedom from liability to decay, the ease and rapidity of erection, its economy and the freedom from vibration, &c. From this introduction we quote a few paragraphs regarding some general aspects, in regard to which the authors offer some happy observations—namely :—

> "The place of reinforced concrete as a building material may be well represented by drawing two circles to overlap one another, one representing structural iron and steel work and the other masonry. The area formed by the overlapping of the two circles, which represents the common province of these two forms of construction, and where they may be used in combination, is the special field of reinforced concrete. Within this area it will be cheaper than steel or iron by reason of the simplicity of construction and cheapness of materials, and more economical than masonry by reason of its comparative smallness of weight and quantity; while outside it is unable to compete with iron and steel work by reason of its weight, or with ordinary masonry by reason of the cost of construction.
>
> "Reinforced concrete construction is at present mainly in the hands of the patentees of the different systems, and of firms who have patented some detail of construction and make a speciality of this kind of work. It appears at first sight difficult to design and carry out structures of this nature without infringing some of the many patents. It will be found, however, that the really valid patents are, generally speaking, those for some small detail, and that the main principles are not patented, and in fact are unpatentable. There are many ways of embedding iron or steel in concrete to obtain the results required, and if one form is patented, and the patent is valid, there are other forms which could be used just as well.
>
> "It will be found that the principal firms who carry out this form of construction do not rely so much on their patent systems for bringing them business, as upon the fact that they thoroughly understand the work, and have in their employ men who have become thoroughly accustomed to use the care and forethought which are undoubtedly required. They also know how to use their materials to the best advantage, and having given special attention to the study of this form of construction, they are able to do the work better and cheaper than others who are not so intimate with it.
>
> "At first sight it may seem a disadvantage that the construction in reinforced concrete and masonry should be in a great measure in the hands of a few firms. We must remember, however, than the bringing of reinforced concrete and masonry into general use is mainly, if not entirely, due to the men who have studied the subject more or less thoroughly, and who in consequence brought out the several systems.
>
> "It is advisable in many ways that the firms constructing in these materials should, at present, be employed to do any work of this kind, as they thoroughly understand the methods and have suitable men in their employ. If work of this character is undertaken by those not well accustomed to its special requirements, they will probably find that it will cost more than if done by a good firm who make a speciality of the work, and they will also find that men must be trained to use the special care which is necessary in the erection of reinforced concrete or masonry structures, and that although ordinary labourers with good supervision are certainly all that are required, it will still take some time to bring an ordinary navvy to understand that the concreting he is employed upon must be treated in a very different manner to that he has been accustomed to. Even when reinforced concrete has come into general use, it will probably be found advisable to employ some recognized firm which is accustomed to the work when a structure of this material is to be erected."

The second part of the book deals with various systems employed, these being arranged in alphabetical order. We notice a few omissions, some of which are important. The authors are obviously aware of them, although they have omitted to deal with these particular systems adequately and, as we think, in their proper place. For instance, we refer to the description of mesh reinforcements, Ransome's and other twisted bars, Thatcher's bars, and Johnson's indented steel bars, which are placed under the heading of "Materials Employed." These forms of reinforcement have been extensively used in the United States and their applications have resulted in systems quite as distinct as many of those recorded at length under the heading of "Systems Employed." The manner, too, in which the systems are dealt with is, in many instances, very inadequate. The various structural requirements met by the various systems are not properly brought out. There are many sides to the subject, and we think that the claims of the various inventors should have been more carefully considered and recorded, for nobody can come to any definite conclusion as to the real advantages and disadvantages of the many systems until things have settled down after many years' use. The theory, even, is not thoroughly determined yet, and this must leave the practical aspect in doubt. Under this division in the first edition there was reference to Hyatt's system. This has been entirely expunged from the present edition. We quite appreciate it being taken out from the division relating to systems now in use, but it should have been dealt with, at all events, in some way of another.

Coming to the third part of the book, dealing with materials, there is a description of cements, aggregates and forms of reinforcement. This is very short considering the importance of the question. The subject of mechanical bond, high elastic limit steel, and the effects of temperature, moisture, preparation and constitution of the aggregates and the cement all require more detailed treatment.

Part 4 is devoted to practical construction, describing the methods employed in the erection of reinforced concrete structures, such as centering and forms, pile driving, &c.

Part 5 deals with experimental research, and data deduced therefrom, in an interesting and serviceable manner, though the various tests are not perhaps so well summarised and criticised as they might be. Details are important, of course, and if there is space it would be well to have the tests recorded in full in an appendix, but if there is not sufficient space for this to be done, reference should be made to the original sources and only an adequate summary published. The reader should not be overloaded with a lot of varying results, which must only mystify and inconvenience him. It is, of course, well to leave the student to draw his own conclusions where there is any doubt in the matter, but much of the experimental data recorded could have been rejected by the authors without any fear of doing an injustice to their subject.

Part 6 deals very extensively with calculations, but not at such length or so diffusely as was the case in the first edition. In this edition the treatment has, indeed, been very much improved, and the student can gain a grasp of the subject much more readily. It is, however, still inconvenient for reference by the designer, who requires to refer to formulæ easily and quickly without being troubled with a lot of explanatory detail. The authors use a very long list of symbols in their formulæ, to which constant reference needs to be made in order to interpret a calculation that may be referred to by the designer. This is a disadvantage. We think it would have been possible to abbreviate the list of symbols and to have used a shorthand which was more intelligible on the face of it.

Part 7 of the book deals with "Some structures which have been erected in reinforced concrete," photographs and drawings of the construction being included. These are all valuable and repay careful study. At the end of the work there are several appendices dealing with tests by various observers, and also works constructed by Major Stokes-Roberts in India.

Altogether Mr. Marsh and Mr. Dunn have produced a very valuable work which ought to be closely studied by architects, engineers and students of the science of construction. In offering our criticisms we do not wish to infer that we do not appreciate the authors' work most highly. We wish that the majority of books on building construction were of equal merit. The authors have evidently gone to great pains to give the fullest information on the subject, and our extended criticism is offered with the object of perhaps assisting them to realise directions in which improvement and extended information might be welcomed, adding to the already high value of the work.

The book is a large one and excellently produced by the publishers.

"Reinforced Concrete," by Charles F. Marsh and William Dunn. London: Archibald Constable & Co., Ltd. Price, 31s. 6d. nett.

ELECTRIC RIVETING AND DRILLING.

We illustrate on this page two electrically-operated appliances for riveting and drilling steelwork. These are manufactured by Mr. Carl Flohr, of 73a, Queen Victoria Street, London, E.C. Electric drills are, perhaps, somewhat fairly well known, but an electric riveting machine is a decided novelty, the majority of riveting machines being driven by hydraulic or air pressure. The distinguishing feature of the machines here shown is that they are suspended in such a way that in a few seconds they can be placed at any angle, whereas the ordinary machines are often permanently fixed or remain at one angle, necessitating the work being turned so as to be normal to the direction of the applied pressure. Obviously, it is inconvenient to turn and lift long and heavy pieces of steelwork to get them into position under the machine; it is much more convenient to be able to shift the machine.

The Riveting Machine.

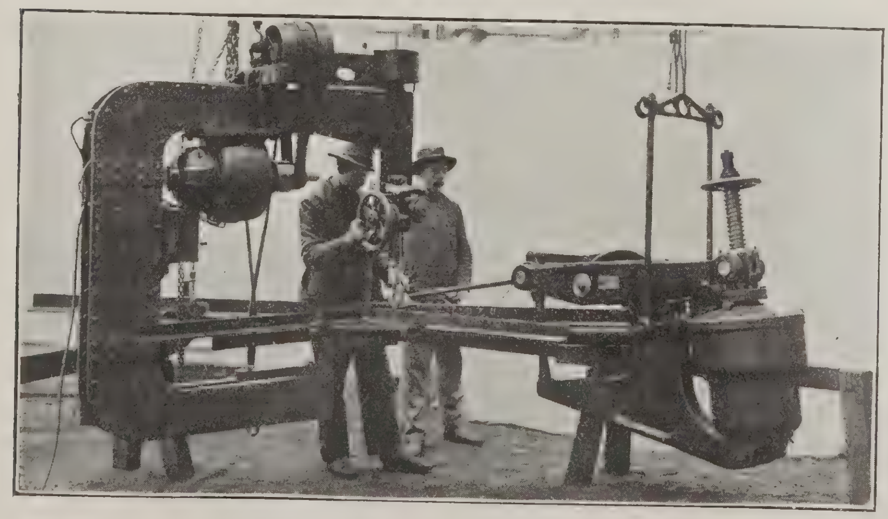
Regarding the electric riveting machine, we may first refer to the disadvantages possessed by hydraulic power or compressed air as a means of driving. The transmission of power by the ordinary methods requires strong pipes, which are somewhat difficult to bring into the required space, and are subject to frequent leakages and loss of energy during the time the machine is not working: moreover, they require an expensive installation, are complicated, and need experienced and continuous attendance. In view of these disadvantages, riveting by hand is sometimes preferred. The transmission of power to the electric riveting machine is obtained by a simple wire cable, which may be connected to any light or power circuit near the place of working. The consumption of current is very small. At the time of riveting the machine requires less current than a normal arc lamp, and in the intervals between each separate riveting it only needs the current for the motor. For longer intervals the current is taken off entirely. The cost of running is, therefore, very small. By simply pressing the button the machine is brought into action, the vertical spindle is turned, and on this spindle moves the nut connected with the double-armed lever; the riveting is then done. The current is cut off automatically as soon as the rivet is finished, and the tongs open, which means that the nut runs back to its lowest position. The automatic cut-off of the current according to the diameter of the rivet can be easily regulated by a hand wheel. Only one man is required to look after the machine, and he can easily move it along the overhead track from rivet to rivet, and at the same time put in the heated rivets and effect the riveting by pressing in the button. It is a great advantage that the rivet can be inserted from above, not requiring to be held at all. The machine works without noise and the riveting is quickly done—namely, in about one second, so that the number of rivets per hour is only limited by the time for heating and inserting them. The machine can be used for heated rivets from $\frac{3}{8}$in. up to 1in. Smaller rivets may be riveted cold.

The over-all dimensions of the machine are as follows:—Length, 5ft. 3ins.; height, 5ft.; width, 2ft. 4ins.; mouth opening, 10ins.; weight, 22cwts. The machine is built for continuous current as well as for any kind of phase-current, and for any voltage.

The Drilling Machine.

As regards the suspended electric drilling machine, this is the outcome of 50 years' experience in crane bridge work, and has been constructed to facilitate the quick and true drilling of girders and plates in Mr. Carl Flohr's own works. It is a familiar fact that if girders, angles and plates are drilled separately according to dimensions on the drawings, the holes frequently do not fit and have to be eased, or else the rivets do not fit the hole entirely and dangerous stresses are introduced. By this machine, the sections, clamped together, are drilled through at the same time, and the machine is constructed so as to use the pressure of the drill for pressing the single pieces of steel together, thus ensuring a perfectly circular hole. The view we publish shows how the machine is balanced in position. The point of suspension is movable in a sliding carriage, and the machine can be used for horizontal drilling by suspending it opposite the spindle; it can also be used as a stationary machine by fastening the frame in the floor or wall.

The feeding of the drill is either worked automatically or by hand, and the reversing is quick. The lower part of the channel-section frame is built so that different iron braces can be fitted in order to counteract the pressure of the drill.



ELECTRIC RIVETING AND DRILLING MACHINES.

As regards the efficiency of the machine, it may be stated that it will drill 700 to 800 holes of $\frac{3}{4}$in. diameter and 5-16in. depth in about 10 hours. The over-all dimensions of the machine are as follows:—Length, 5ft. 3ins.; height, 6ft. 7ins.; maximum lift of drill, 8ins.; maximum reach, 4ft.; maximum diameter of drill hole, $1\frac{3}{16}$ins.; approximate weight, 15cwts.

STRUCTURAL STEELWORK.

The Commercial Side.

By R. H. Jackson.

The essence of commerce from the buyer's point of view is getting good value for money. The market value of any article, from the vendor's standpoint, is the biggest figure the label will carry without scaring off potential customers. An ideal contract is one which blesses both the seller and the buyer; where the one gets fair market value and the other gets good value for money. But an ideal contract has not yet been made, and in this imperfect world it is very improbable that it ever will be. Relying on a more or less general acceptance of all these platitudes, it will be pertinent to notice some of the anomalies which are encountered in fixing up a contract for steelwork.

Appalling Conservatism.

To begin with, architects in this country are not altogether, even at this hour, fully alive to the huge importance of rolled steel in building work. Building regulations, we know, require drastic alteration before they come abreast of modern ideas. But there is an appalling conservatism, begotten of an all-too-ready acceptance of threadbare tradition, which is a still greater deterrent to progress in this direction. It is no rash presumption to believe that Pericles would have used steel stanchions if he could have gotten them. The Colosseum would have been run up on a frame of joists and channels if Vespasian, or the more enterprising Titus, had found the material available. Yet we see men to-day forgetting the first principle of architectural economics, that of using to the fullest extent the material they find ready at hand.

Now, assuming the acceptance of the idea, in suitable cases, that to build on the steel frame principle is the only sensible thing to do, the admission is readily forthcoming that there is some lack of sound precedent as to the correct way for the architect to set about it.

Its Justification.

To justify its use, the system should show distinct advantage, firstly, in facilitating the job as a whole, and secondly, in effecting saving in cost. In ordinary circumstances, however, even with the present high price of steel and strong demand, these advantages should obtain clearly and convincingly.

Steel itself, be the market never so vigorous, is always relatively cheap. There is no material which can in any way approach it in point of service, bulk for bulk, and there is nothing more easily handled and fixed into position.

Of the diversity of method in inviting estimates of cost, it would be well to refer to one or two insurances.

Obviously the soundest method is for the architect to draw out his entire design complete in all details, with a full specification of plain material and connections and other workmanship, including the quality of steel required and stipulations as to finish. Given such an enquiry, a constructional engineer is at once able to get out his costs to a very fine margin, and feels justified in putting forward a competitive tender. If a design and specification are complete and straightforward, there are none of those potential "extras" to be provided for, which always swell the figures for an indefinite or incomplete enquiry.

Modifications in Design.

In a fully-detailed design such as that we have in mind it is always prudent to stipulate that if the contractor proposes to modify any part of the design in the slightest degree, he must state clearly in his tender what that modification is to be, otherwise his tender will be regarded as covering in every respect the design put before him.

Far be it from the writer's intention to suggest that the steelwork contractor habitually takes undue advantage of latitude allowed to him, but there is always a strong temptation to use up the contents of his stock-yard rather than buy fresh material, and in other ways to keep his costs well within his estimate.

Consulting Engineer.

Now, with the intention of inviting tenders against a definite and complete design, the architect from various circumstances may choose to hand this part of his work over to a consulting engineer. This, on the face of it, is a most logical proceeding, but there are times when it has its little drawbacks. Much, of course, depends upon the individual consulted. Some unkind cynics say that no man in any technical line takes to consulting work unless he is convinced of his incapacity to do practical work for himself. Now, the cynicism of this conclusion is self-condemnatory, and to accept it as an axiom would be very unjust to a number of capable men.

Cost and the Engineer.

Here, however, the question of cost presents itself in double form. In the first place, the client does not want to pay a fee which will come to a tolerable percentage of the cost of the whole building, and in the second place he does not want a design to be turned out which, although a monument of strength and stability, is too overloaded with metal and work to be anything like economical in execution.

The fatal weakness of many consulting engineers is something akin to fetish worship, the fetish being a collection of formulæ and axioms to which all else must pay tribute. Text-book maxims and proven data are very fine adjuncts to practical knowledge and sound commonsense. But economy in material and economy in work are hopelessly impossible if the design is not based upon the results of practice and observation, as well as dogma.

Fit for a Dockyard.

We have seen framework for a harmless and inoffensive hotel which had more than sufficient bulk of steel and invincibility of fastenings to have sustained a dockyard foundry, cranes and all. This represented a pathetic waste, equally in drafting, material and labour. Yet when the writer ventured a little mild criticism he was confronted with an array of formulæ and authoritative data of all sorts which was irrefutable in its logic and invulnerable to disparagement. It would be safe to say that the same structure could have been run up with an ample factor of safety and a clear 25 per cent. saving in costs.

However, this is but one case, and in the matter of consulting assistance, as in all others, a little discernment is a very necessary thing.

The Usual Method.

Perhaps the course most frequently followed in inviting tenders for steelwork is that of issuing the enquiry without any scheme of construction, leaving the contractor to draw out a design and quote upon it. Certainly in point of convenience this has much to commend it, but as a general practice it does not conduce entirely to the common good.

If, for every contract placed, say half-a-dozen engineers have each submitted a design, and only one design is, of course, used, it represents a total expenditure in labour of about £150. Of this the whole is wasted except the costs incurred by the successful competitor. Who has to pay the remaining, say, £125? Not the constructional engineer, because the costs of tendering are charged upon his year's output; it is the consumers as a body who pay.

The same question arises, of course, in every business to a certain extent, as regards such expenses as travelling representatives, free samples, and so forth, but the relative proportion of such costs to business done is a small item compared with the cost of getting out a steelwork design.

Difficulty of Selecting a Tender.

Again, in the matter of selecting a tender out of the half-dozen submitted, many difficulties present themselves. The prices appended are by no means the most equitable basis for comparison.

If all the designs were in the main identical as regards the sectional and other material employed, it would be plain sailing. But the chances of this being the case are extremely remote. In the matter of columns, for instance, Jones will swear by cast-iron; Brown has a subtle combination of angle iron and steel plates; Robinson submits a strange conception of interlacing bars resembling a collapsible step-ladder; others are divided between solid **H** sections and channel combinations. Each is represented to be adequate, and each is supposed to represent an economy which goes to the enhancement of the remainder of the scheme.

In the matter of girders comparison is rendered more feasible, as a little calculation is sufficient to either prove or condemn the various parts.

Connections.

Joints, connections, bases, &c., are always difficult to judge upon precisely, and these call for careful attention in the selection of a design. No scheme is a cheap one where this part of the work is not thoroughly and conscientiously done, and it is here that differences in prices are generally effected. A little skimping right through in this respect represents a very considerable reduction in a lump sum price.

In fact, the whole question of selecting from competitive designs reduces itself to one of the factor of safety. The absence of a standard code of practice applicable broadly to all ordinary classes of construction does much to aggravate the question, but no doubt time and increasing knowledge will evolve something of this nature. It is manifestly unfair that a tender which is based on careful calculation and experience of results should be placed side by side with one which represents the absolute minimum of material and labour and a consequently hazardous factor of safety.

Speed.

In large towns the question of time limit for completion is one of the greatest importance. When the constructional steelwork business was in fewer hands than it is to-day, its sponsors did not enjoy a very high reputation for reliability in this respect. A definite promise to complete in six weeks very often turned out to mean as many months, and makers could afford to decline to accept any penalty clause.

An Anecdote.

We recall one such case where, on the date due for delivery, the makers reported very satisfactory progress, but asked for a further four weeks in consequence of pressure of other work. This was granted by the architect, but the end of the month did not see the anticipated completion of the job. A further fortnight was asked for to put on a few finishing touches and "fit together" to ensure entire satisfaction. After that there was further dallying through scarcity of waggons. The works could not get waggons at any price, but directly they had fixed this matter up with the railway company the material would be despatched. The architect, however, thought he would hurry up the question of waggons by going to the works and bringing a little personal pressure to bear. Without having announced his intention, he arrived at the works one morning, and to the confusion of the engineers he found that instead of being completed, the job had not even been commenced.

Improved Conditions.

Things, however, have improved considerably in this respect, and there is a greater tendency to cultivate confidence by delivering within a reasonable margin of the stipulated time. It is always well to remember that a very short and stringent time limit may add considerably to costs, and a penalty clause, unless prefectly reasonable, is not entirely an advantage.

In larger contracts, if the time allowed is not sufficient to enable the constructional engineer to make sure of getting the bigger items from the rolling mills, he is obliged to include in his estimate for buying material from stocks at enhanced cost.

Here again the personal equation is in strong evidence, and once mutual confidence has been established between the contractor and the architect, the largest works can be carried to a successful conclusion without loss or dissatisfaction on either side.

REINFORCED CONCRETE SYSTEMS.

X.—Hodkin & Jones' Corrugated Bar.

Herbert Hodkin and William Jones, the founders of the firm of Messrs. Hodkin & Jones, Ltd., of Sheffield, were both practical men in all that related to concrete work and they commenced business about 40 years ago. It will thus be seen that the firm is one of the oldest concrete specialists, and pioneers in the business.

When, about 25 years ago, the public became educated to the fact that fire-resisting floors were indispensable to public safety, the firm laid itself out for extensive operations in fire-resisting flooring, using chiefly the rolled steel ⌶ joists, with sections ranging from 3ins. by 1½ins. to 6ins. by 2ins. It was found in the course of their experience with small joists that those sections with wide flanges caused cracks along the soffits, but it was in the demolition of some of these floors that defects were revealed which led the firm to look for a more suitable form of reinforcement. It was discovered that the concrete was not properly consolidated round wide flanged joists, and that immediately under the top flanges were hollow spaces. Arguing from this, and that there was a wastage of steel in the flanges, Mr. H. H. Hodkin, the present managing director, obtained the idea that if the steel could all be introduced into the web in such a way that the concrete would have a grip of it from bottom to top, he would have a bar of greater efficiency and greater economy. The outcome was the corrugated bar, for which a patent was taken out by Mr. H. H. Hodkin in 1903, since which time the system has made considerable headway.

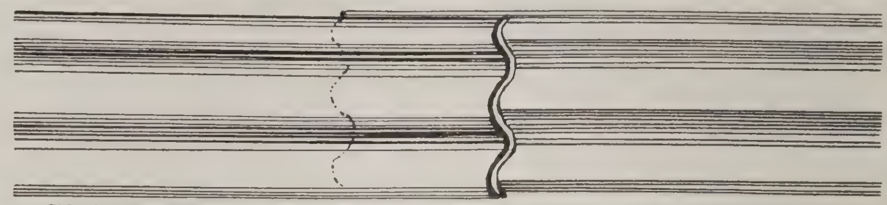
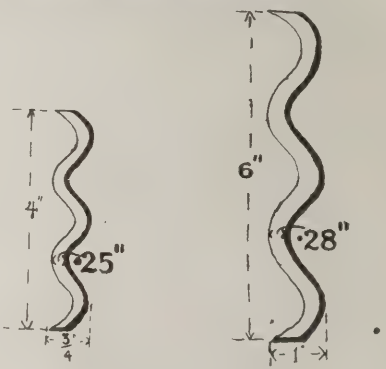


FIG. 4. JUNCTION OF TWO CORRUGATED BARS, SHOWING INTERLOCKING ACTION.

Standard Sections.

Fig. 1 shows the standard sections of corrugated bars used—namely a 4-in. and a 6-in. bar, and Fig. 2 is a full-size detail of the smaller bar. The 4-in. bar is mostly used in practice, it being usually found that the spans can be arranged by disposing the main beams so as to suit. The bars are rolled in England of good mild steel, and tests conducted by the Sheffield Testing Works, Ltd., showed that the ultimate strength was 25 to 27



Moment of Inertia = 1·733. I = 7·3

FIG. 1. SECTIONS OF 4-IN. AND 6-IN. CORRUGATED BAR.

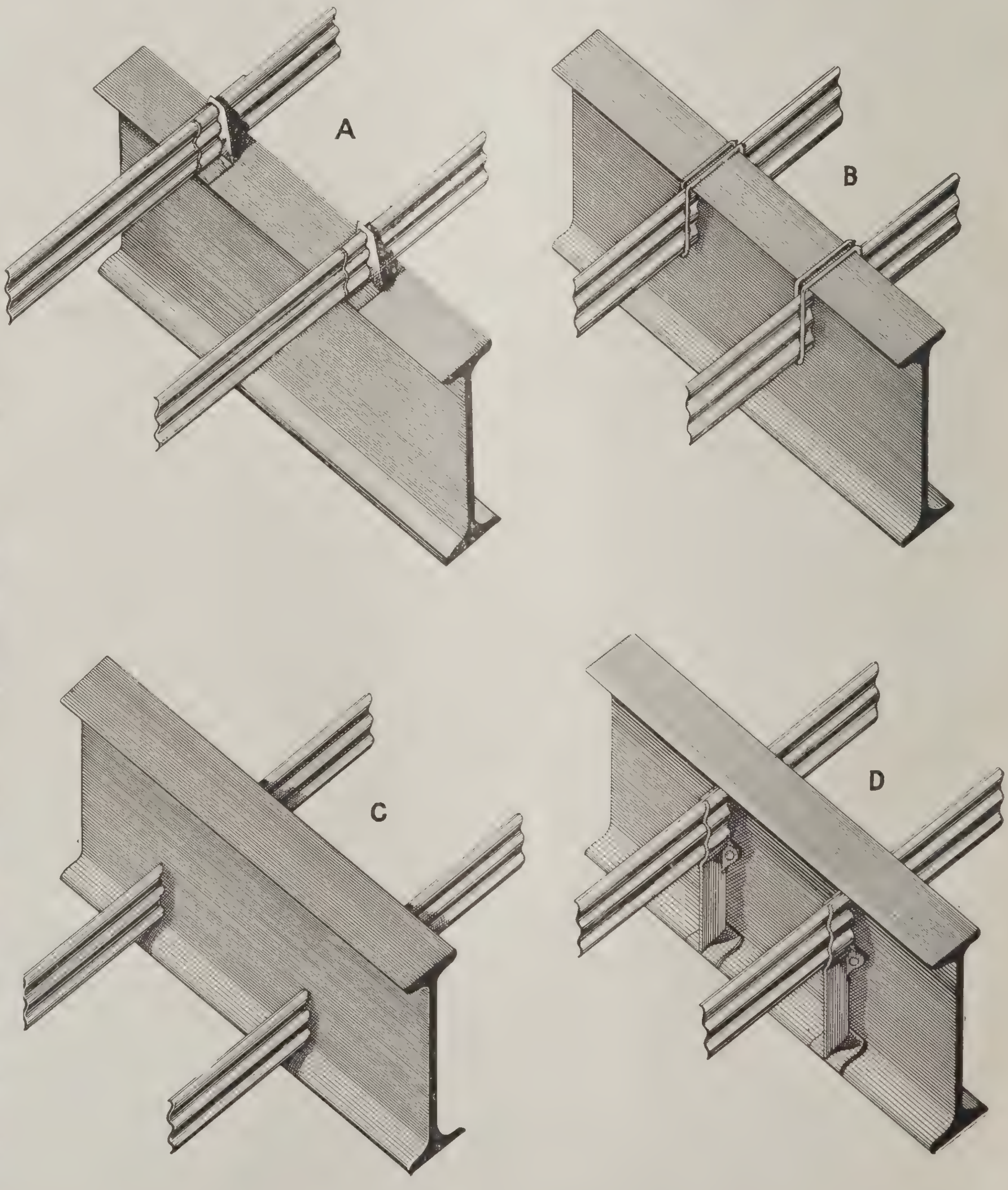


FIG. 3. VARIOUS TYPES OF CONNECTIONS TO FLOORS.

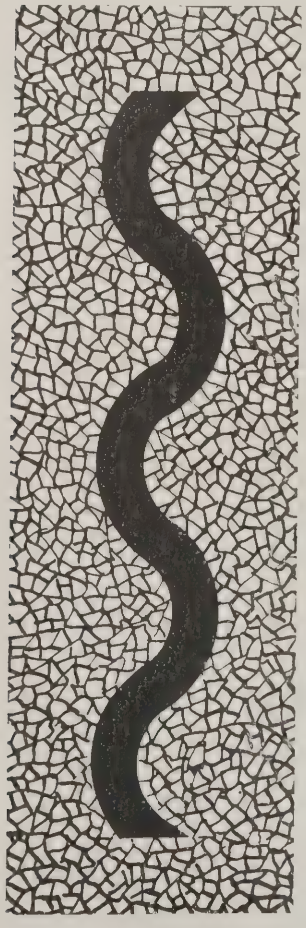


FIG. 2. FULL SIZE SECTION OF 4-IN. BAR.

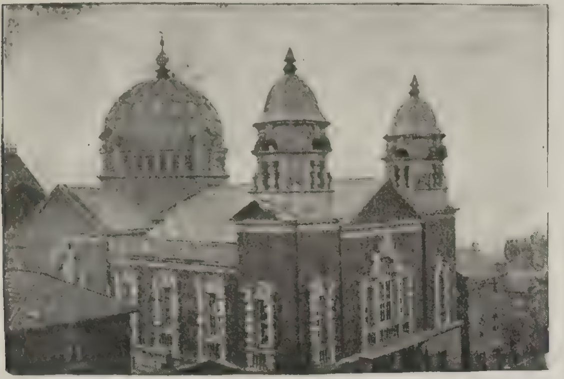


FIG. 7.—WESLEYAN CHURCH, WOLVERHAMPTON. ARTHUR MARSHALL, ARCHITECT.

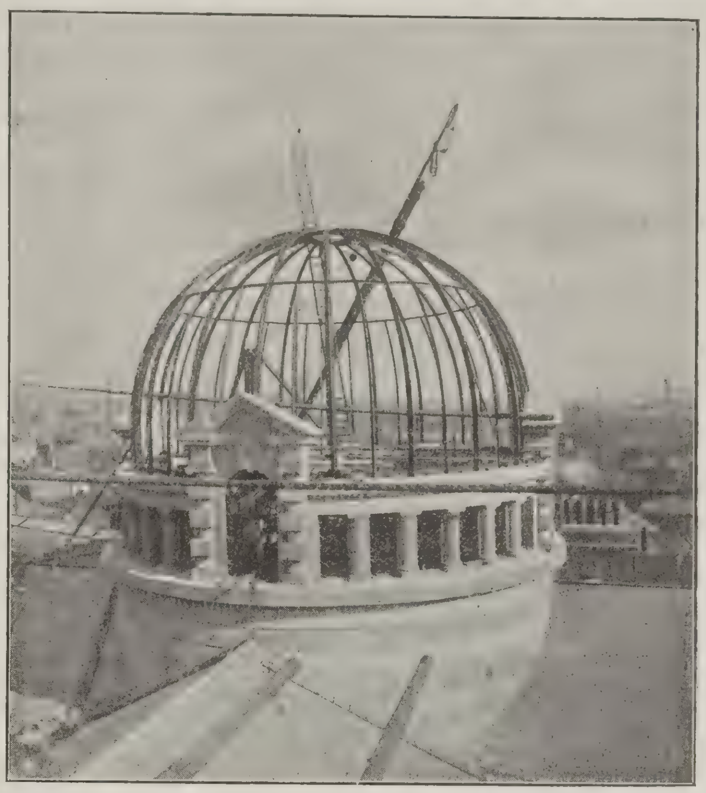


FIG. 8.—DOME AT WOLVERHAMPTON WESLEYAN CHURCH, IN COURSE OF CONSTRUCTION.

tons per sq. in., while the elastic limit was from 16 to 19 tons per sq. in.

A test carried out to compare the strength of a small joist section with the corrugated bar resulted in showing that for the same weight of metal the corrugated bar was stronger. Of course this is easily understood because the moment of inertia is greater than an ordinary rectangular bar, while the bar is deeper than a rolled steel joist of the same weight. Obviously the corrugated bar must be rigidly kept upright so as to prevent buckling. This support is given by the concrete in which the bar is embedded, and by the connections at the ends of the bars, which are carefully studied so as to hold tightly to the bars. Figs. 3 and 5 show connections that have been adopted and illustrate this **point.**

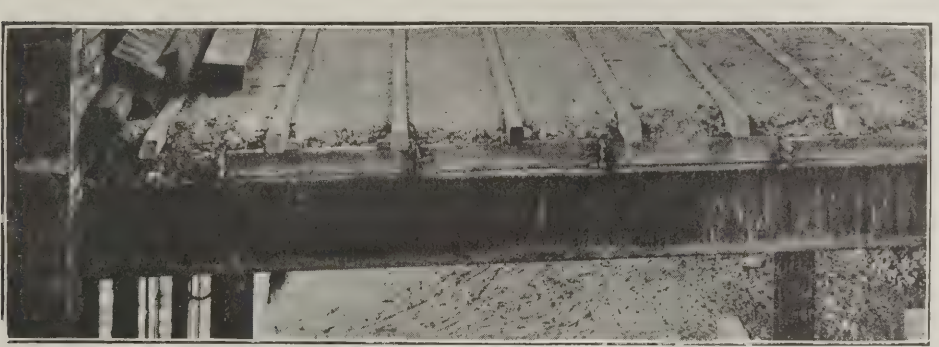


FIG. 6.—FLOOR IN COURSE OF CONSTRUCTION.

The corrugated bars do not merely strengthen a concrete floor by adding a tension member, they are large sections with a moment of inertia that cannot be neglected, and they can support a floor alone. These bars then stand midway between the joist that supports the concrete without assistance from the latter and the steel rods, which offer no support to the concrete, but depend upon the latter for mutual assistance in order to keep up.

Argument for the Bar.

It is not purely a question of theory in considering a system of reinforced concrete construction. Economy has to be studied and the practical execution is of first importance as affecting it, and must be carefully considered. Now the Hodkin corrugated bar has a good many practical advantages which we must take notice of. Firstly, we have the question of custom. The ordinary workman and foreman is used to using steel joists for concrete floors and there is very little difference in substituting corrugated bars. No error in placing the rods in position is to be feared, whereas in using small section bars there is great risk of the bars getting out of place. There are numerous instances to prove that there is great risk of misunderstanding by ordinary workmen of the necessity for care, and failures have resulted therefrom. To be sure of the work with small section bars acting in tension only the supervision must be close and expensive. Then again, the work of placing a multitude of small bars in position is an increase of labour. Again, in such floors the stability being dependent upon the concrete, if this is defective the entire floor must fail before any load comes on it, whereas the corrugated bars are strong enough to support the concrete. This further allows the centering to be removed before the concrete has become thoroughly set, if necessary. The centering is thereby saved and the work expedited. Indeed, the centering is simplified by the possibility of supporting it from the main steel beams and, if necessary, from the corrugated rods to some extent. All these points effect the economy of a structure, while the less one relies upon the

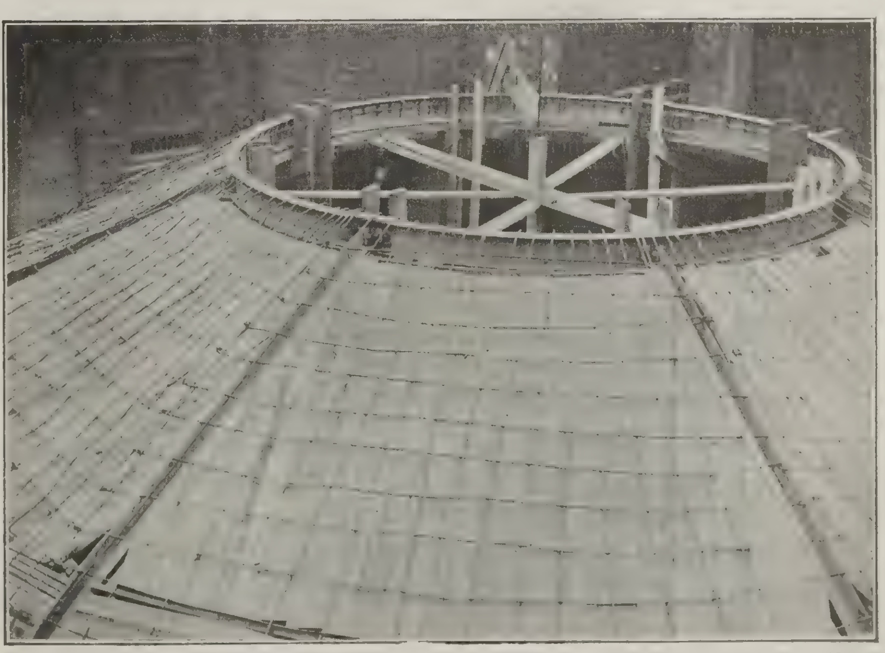


FIG. 9.—DOME AT STEPHENSON'S RESTAURANT, SHEFFIELD, IN COURSE OF CONSTRUCTION.

intelligence of the ordinary more or less unskilled workmen the better. The labour with Messrs. Hodkin & Jones's system can be rough and ready and there will be no need for qualms, for if there should be a defect in the concrete it would make itself apparent and could be remedied without fear that it would collapse and bring down the structure. These are all very important points and should be carefully weighed in any work in hand.

Hold for the Concrete.

It will be seen from Figs. 1 and 2 how the concrete gets a grip of the corrugated steel bar at all points. In the case of a deep flat bar on edge or the web of an I-joist there is nothing to hold the concrete except adhesion, which is small and may easily be destroyed. With the joist, as a rule, only the bottom flanges offer any resistance to the concrete falling through, unless the thickness of the floor is sufficient to enable the top flanges to be embedded in the concrete, which is not usually the case. As was before stated, the concrete in floors with I-joists seldom fills the spaces round the web underneath the top flanges. This cannot occur with the corrugated bar; the concrete is bound to lie close and tight against it all over. The patentee's claim that this secures immunity from cracks along the line of the bars (the greatest tendency for which occurs with wide flanged joists) is reasonable enough.

Connections and Types of Floors, Roofs, &c.

Fig. 6 shows a floor reinforced with Hodkin's corrugated bars in course of construction. The ends of these bars are clearly seen. This shows the general type of floor, but there are various points as regards details which we would deal with. There are many ways in which the bars can be used, but we will confine ourselves to examples of what has been done. Fig. 3 shows four ways in which the bars are suspended or connected with the main beams. Diagram A shows the bars resting on the top of the beam slotted into a sheet metal cleat. This, of course, might give too great a depth to the floor, the main beams being thought to project too far below the ceiling, and the other methods, B, C and D, offer various methods of overcoming this. Before dealing with them, however, we would remark that in method A the ends of the bars lay tightly together, the corrugations fitting into one another, as shown in Fig. 4, so that when the concrete is packed round the bars a good joint is obtained which ensures a considerable amount of continuous action. This continuity not only greatly increases the strength (although this is not calculated for by Messrs. Hodkin & Jones, being thrown in merely as an extra margin of safety) but it is in addition preventive of the possibility of cracking developing along the main girder.

In method B wire stirrups are used. Flat-iron hangers with punched holes or slots cut out to fit the corrugations exactly might be substituted if desired; they would certainly give a better hold against twisting.

In method C the bars are laid on the bottom flange of the main girder, so as to obtain a level ceiling. This shows how a hollow or double floor could be constructed for improved soundproofness and appearance.

Method D shows an alternative method of supporting the bars, slotted malleable castings being used to secure a direct bearing on the bottom flange, the castings being riveted or bolted to the main beam to keep them rigid and in position. The stirrup method B is, of course, more economical and satisfactory than this. D is shown, however, as it has been actually adopted to meet architects' wishes.

At the point where end bays of floors adjoin the walls it is recommended that the brickwork should be corbelled out so as to assist in supporting the floor. A chase answers equally well where the thickness of the walls admits of it, but it would obviously greatly weaken a thin wall. A corbel or chase of 2ins. is considered sufficient. The ends of the bars go into the wall at least 6ins. In exceptional cases Messrs. Hodkin & Jones adopt small castings fitting into the walls and slotted to receive the ends of the corrugated bars. These are used chiefly in cases where the bars cannot be put in as the walls go up, and the small castings are built in instead and the bars afterwards slotted in.

As regards trimming for floor openings and connections in mansard roofs, the bars lend themselves to simple treatment. Here again resort is had to malleable cast-iron cleats with corrugated faces, which have a lock and do not depend on the bolts, as shown in Fig. 5.

The corrugated bars are often used for reinforcing lintels.

Aggregate.

Messrs. Hodkin & Jones, of course, work concrete in all its various forms, such as moulded work or artificial stone, terrazzo, and partitions, to a large extent. Their works at Sheffield cover 3 acres. Naturally they pay special attention to the quality of concrete used, and it is interesting to note that where the locality admits of it they have a preference for crushed bricks for concrete floors; they have special machinery which reduces the bricks to ¾in. in size and cleans out the dust, &c. This, with good sharp sand, in their opinion, makes the best aggregate for fireproof floors.

Calculations.

The theory of reinforced concrete design commonly either has reference to the use of small sections in tension or the use of large sections, such as I-joists, which sustain the load with little or no support from the concrete. In the case of Hodkin's corrugated bar, however, we have an intermediate form. The modification of theory necessitated is dealt with in most books on reinforced concrete. The strength of a beam then becomes not merely attributable to the resistance of the concrete in compression and of the steel in tension, but also to the moment of inertia of the steel sections.

Two tests have been carried out by Messrs. Hodkin & Jones to compare their 4-in. bars with ordinary I-joists for reinforcing floors. The widths, spans, proportions and composition of aggregates and cements, loading and weight of reinforcement, were identical in both cases. The size of the portions of floors tested was 10ft. by 11ft.; the span between supports was 9ft. The ends of bars and joists projected from the concrete, and were freely supported. The bars and joists were each spaced 2ft. apart, and the weight of each was the same—namely, 4lbs. per ft. run. The thickness of the concrete was 7ins., that is to say, there was 3ins. of concrete above the corrugated bars. The age of the concrete when tested was 28 days. The load was applied by means of bricks, which were not placed all over the floor area but occupied a space in the centre, 8ft. by 6ft. Whereas the ordinary I-joist floor collapsed with a load of 16 tons 11cwt., the corrugated-bar floor failed at 21 tons 1cwt.

Domes.

The firm's work in reinforced concrete has not been nor is it now confined to the use of corrugated bar reinforcement. There are circumstances where they would not be suitable. Cases in point are domes, of which Messrs. Hodkin & Jones have executed several. One of their most striking and earliest efforts in this direction was the concrete dome of the Wesleyan church at Wolverhampton, shown in Fig. 7. The reinforcement in this consisted of bars of an ordinary T-section, and the arrangement of the reinforcement is clearly shown in Fig. 8. This dome is not covered with copper or lead; it is merely moulded in fine granitic finish. A more recent example of domework is shown in Fig. 9. ⅝-in. round bar reinforcement was used, laced basket-fashion in about 12in. squares. The diameter of the dome at base is 40ft. and the thickness of concrete 7ins. The light T-ribs are about 15ft. apart; they were added after the original scheme and are not an essential factor in the construction.

The following is a list of a few buildings in which the floors have been reinforced with Hodkin's corrugated bars:—

New premises for Messrs. Hayward Brothers at Kennington, S.E.; theatrical stores, Camberwell, for Mr. Forbes Robertson; printing works at Letchworth (Garden City), for Messrs. J. M. Dent & Co.; new premises at Sheffield for Sir Henry Bessemer & Co. Ltd.; new premises at Birmingham for Messrs. Heeley; the General Electric Co.'s Works, Birmingham; furniture repository, Tunbridge Wells; new paper works, Dover.

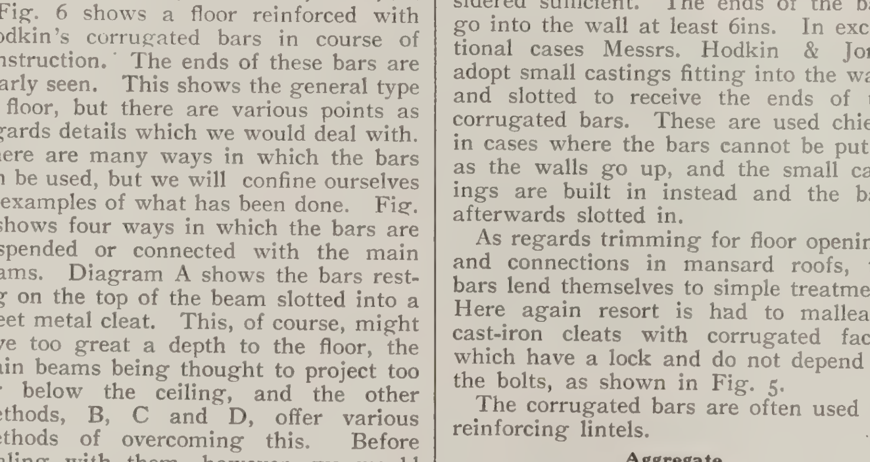


FIG. 5. CONNECTION FOR MANSARD ROOF AND TRIMMING FOR FLOOR OPENINGS, USING MALLEABLE IRON CLEATS WITH CORRUGATED FACES.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.

February 27, 1907.

CONCRETE AND STEEL SUPPLEMENT (MONTHLY).

TWO STEEL FRAME BUILDINGS IN LONDON.

The construction of the new "Morning Post" Building and the Waldorf Hotel on Aldwych proceed apace. Both buildings are on the steel frame principle, and are being erected by the same contractors, namely, the Waring-White Building Co., from the steelwork designs of Mr. S. Bylander. The architects of the former are Messrs. Mewes & Davis, and of the latter, Messrs. A. Marshall, Mackenzie & Son.

We have in former issues already described and illustrated certain features of these buildings, and we now add further records.

The "Morning Post" Building

is nearing completion. All the steelwork has now been erected, and almost all the Norwegian grey granite facing has been erected by Messrs. A. and F. Manuelle, the sub-contractors for this work. It is the first occasion that we have seen the elevations of a large building constructed completely of granite in London, and certainly the result is a most striking demonstration of the great advantages the material has for work in London and other large cities, far more impressive than was the Ritz Hotel, the ground floor of which was also carried out in the same variety of Norwegian grey granite by the same firm.

The whiteness of their Grey Royal granite is such that the material appears to be very little darker than Portland stone, while the elaborate detail shows that it will adapt itself to all purposes just as well as stone, over which it possesses the advantage of entirely resisting decay by the London atmosphere which stone cannot—indeed it is practically everlasting. It is, too, stronger than stone, and considering that it is as cheap as Portland stone, we ought to find it adopted more extensively in the near future.

We give on page 26 a general view showing the succession of granite dormers along the Aldwych front of the building, with the steelwork of the Waldorf Hotel dimly seen rising beyond. A detail of one of these dormers is shown on page 27. It will be seen how the pediment is securely anchored back into the roof.

Details of the way the granite work is fixed to the steel frame are also shown on the third-floor framing plan on pp. 24 and 25.

The site upon which the building is erected is a very awkward one for planning, as is seen from this typical framing plan. We have published this plan as a particularly good example of how an irregular site increases the difficulties of the steelwork designers. Simplicity in steelwork makes for economy. The inherent difficulties of such a site are great, and this example will well repay careful study in connection with the architect's plans published in our issue for February 7th, 1906, as a clever treatment. A disposition of the columns has been adopted so as to gain as much simplicity as possible, to which the curved plate girders (a detail of one was published in our issue for October 10th, 1906) at the corners have also assisted.

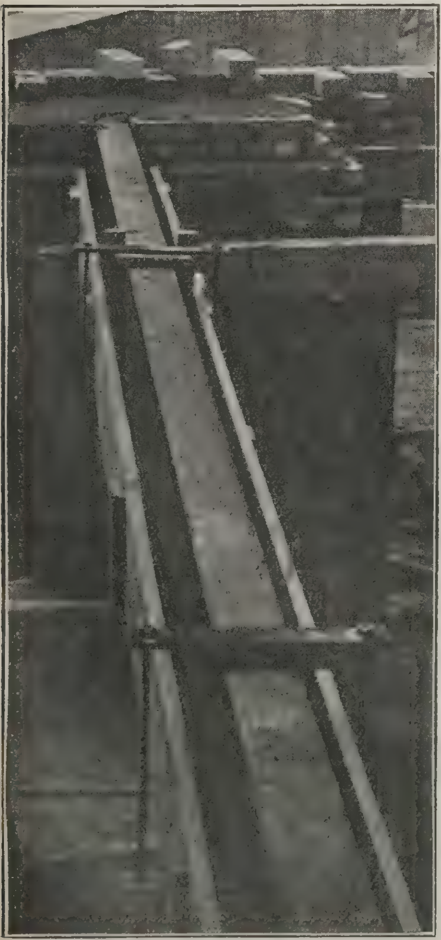


FIG. 1. "MORNING POST" BUILDING: CENTERING FOR CONCRETE ENCASING TO GIRDER, SEEN FROM ABOVE.

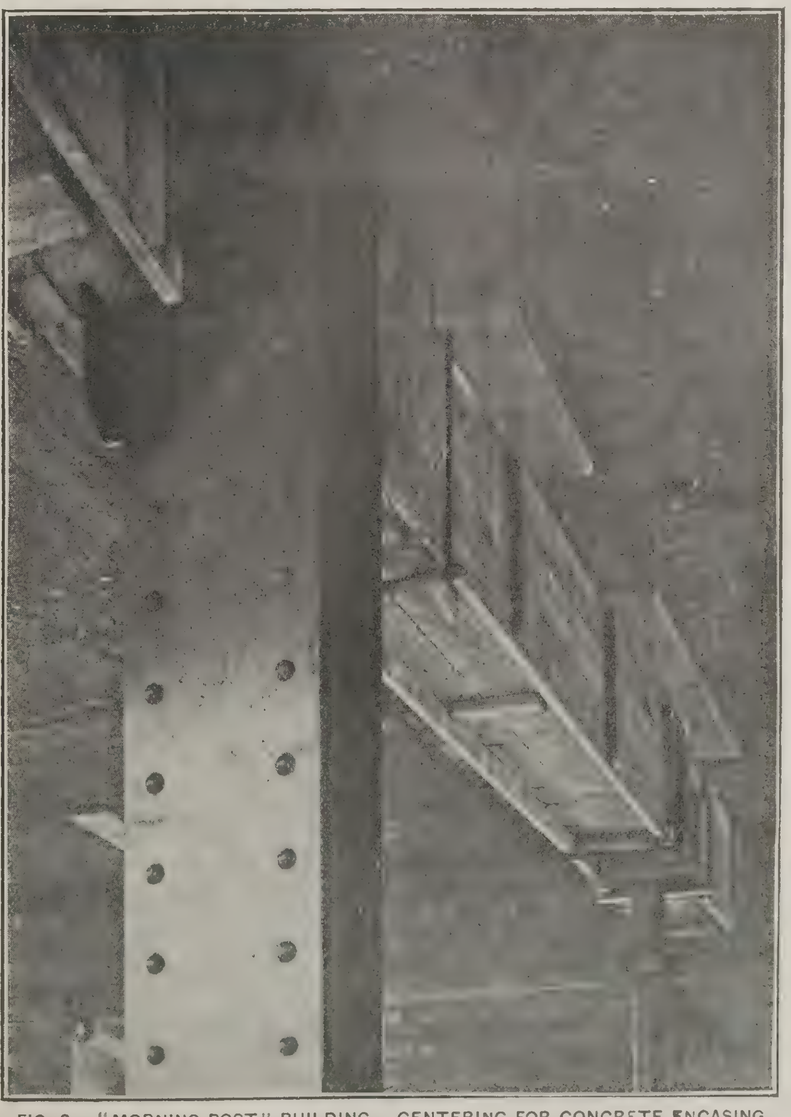
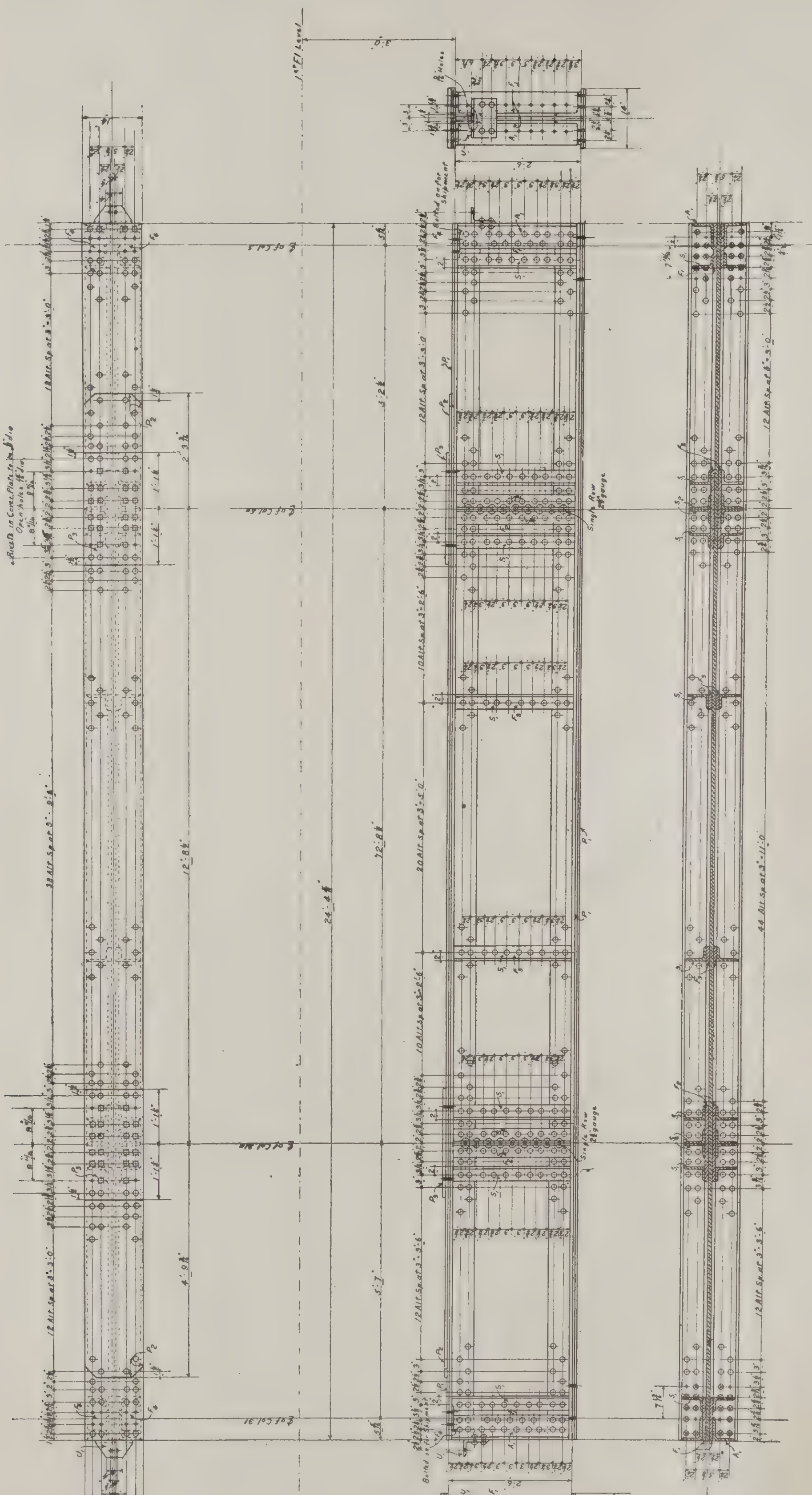


FIG. 2. "MORNING POST" BUILDING. CENTERING FOR CONCRETE ENCASING TO GIRDER, SEEN FROM BELOW.

The Waldorf Hotel.

We give views of several details regarding the steelwork in this building. Figs. 1 and 2 show the box-like form or centre for moulding the concrete round a girder to protect it against fire. Fig. 1 shows a view from the top before the concrete is filled in, while the underside is shown in Fig. 2. In both views the iron hangers which support the centering from the beam are clearly shown.

Fig. 4 shows a portion of the steelwork at the right-hand corner of the site on the Aldwych front looking across the central area. A portion of this view is reproduced to larger size in Fig. 3 in order to illustrate a detail of the steelwork, namely, the wall-anchor which projects from the stanchion. This is slightly at an angle, as the wall (a portion of which is visible already built below) is inclined at an angle to the stanchion. Wall-anchors are not a new thing in building construction, but we publish this view in order to call attention to the fact that they are very often omitted and to emphasise the importance of bonding in some way the brickwork to steelwork where the two conjointly are required to do some work. Thus this particular wall is called upon to sustain a load and is not simply a filling between the steelwork. Both the steel and the brickwork ought to act together and this wall-anchor is a means by which the result is secured. Furthermore, of course, it gives stiffness and stability to the stanchion.



Bill of Material (for each Girder).				
Nos.	Mark	Description.	Section.	Length.
1		Web Plate	2′ 5¾″ × 13/16″	24′ × 4⅝″
4		Main Angles	6″ × 6″ × ¾″	24′ × 4⅝″
3	P^1	Flange Plates	14″ × ½″	24′ × 4⅝″
1	P^2	" "	14″ × ½″	19′ × 8⅞″
2	P^3	" "	14″ × ¾″	2′ × 2½″
4	A^1	Bent End Plates	6″ × 5″ × ⅝″	2′ × 4½″
16	S^1	Stiffener Angles	5⅛″ × 3½″ × ½″	2′ × 4½″
8	S^2	" "	5⅛″ × 3½″ × ¾″	2′ × 4½″
2	U^1	Seat Angles	6″ × 4″ × 3/16″	9″
4	F^1	Filler Plates	10⅝″ × ¾″	1′ 6″
4	F^2	" "	1′ 6″ × ¾″	1′ 6⅜″
4	F^3	" "	3½″ × ¾″	1′ 6″
4	F^4	" "	6″ × ¼″	4⅝″

Make 4 Plate Girders as shown Marked 1st Fl. 311, 291, 281, 261.

Note.—All end angles, stiffeners and filler plates to be ground to fit; ends of web plate to be flush with end angles.

Diameter of rivets to be ¾-in. unless otherwise stated. Open holes 13/16-in. diameter.

FIG. 5.—DETAIL OF PLATE GIRDERS 311, 291, 281, AND 261. FIRST FLOOR, WALDORF HOTEL.

S. BYLANDER, ENGINEER, WARING-WHITE BUILDING CO., LTD., CONTRACTORS.

Fig. 5 is a detail of several of the plate girders used on this job to sustain heavy loads from columns stopped at the first floor level. This forms an interesting example of plate girder design, while it also serves as an example of the way in which the steelwork is detailed. All dimensions are figured on the drawings, it will be noticed, in order that the work can be set out in the shop on the material without the necessity for preparing templates.

We shall be dealing with both these buildings again, when other details of the work will be illustrated and described.

A Reinforced Concrete Warehouse.—Mr. Edmond Coignet has been successful in obtaining through his licensees, Messrs. Peacock Brothers of Brixton, the contract for the floors, posts and roofing of a new warehouse for Messrs. J. Grossmith, Son and Co., wholesale perfumers, Newgate Street, E.C. The architect for the work is Mr. Henry A. Saul, A.R.I.B.A., of London. There will be altogether seven floors calculated for a superload varying from $1\frac{1}{2}$cwt. to 2cwts. per square foot. The outer walls of the building and foundations are to be made in brickwork. A noticeable feature will be the introduction of some large lintel beams. This building will be situated at the corner of Duke's Head Passage and Ivy Lane, Newgate Street, E.C.

CONCRETE FAILURES.

By Thomas Potter.

Concrete work, like most other building processes, is subject to failure when composed of unsuitable materials, dealt with under improper conditions, or executed by incapable workmen under inexperienced surveillance, and when any or all of these occur the cause is not very difficult to trace.

Many failures are not of a serious nature, they attract little attention, and are known only to those immediately concerned; others of greater magnitude we probably hear nothing about; it is against the interest of all employed or interested therein to make such matters public if they can be avoided, as in the case of the serious ceiling and floor failures lately at the Bexley Heath Asylum, which occurred after having been completed five years, the cause of which is unknown to the general public.

It is only when a coroner's inquest becomes necessary that the circumstances connected with concrete floor, roof, and other failures, are made known through the press that we learn particulars that can throw light upon the cause and the result, as in the case of the Orchard Street accident in 1898, when seven workmen lost their lives through the collapse of concrete roofs and floors.

Even where there is evidence of failures that can apparently be easily remedied, it may happen that the remedies are not of a permanent character, as for instance, when they arise from the use of an inferior or unseasoned cement, no care having been bestowed as to its soundness and fitness for the purpose, for, as previously explained in The Builders' Journal, the results arising from the chemical action of the constituents of which Portland cement is made are undetermined for two years at least after its use, and in some cases probably much longer.

In the choice of an aggregate for concrete there is usually but little scope; local facilities usually govern the selection, but, as before explained, there are certain conditions to be guarded against which otherwise may lead to failure, as for instance sulphur in unaerated slag from iron ore, and in cinders from certain chemical works, half burned limestone chippings accidently mixed with locomotive ashes, unslaked lime core refuse from plasterers' mortar, and other materials which will expand when water is added to them, the remedy for which is careful examination, and if possible exposure to the atmosphere and rain for as long as circumstances permit. Where water is abundant the aggregate should be well saturated, which will help to slake any

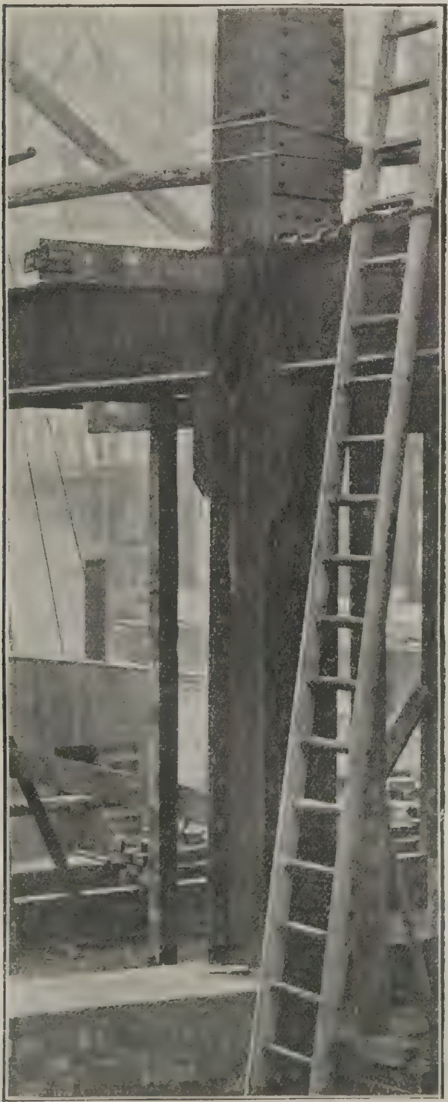


FIG. 3. DETAIL OF WALL-ANCHOR SHOWN IN FIG. 4.

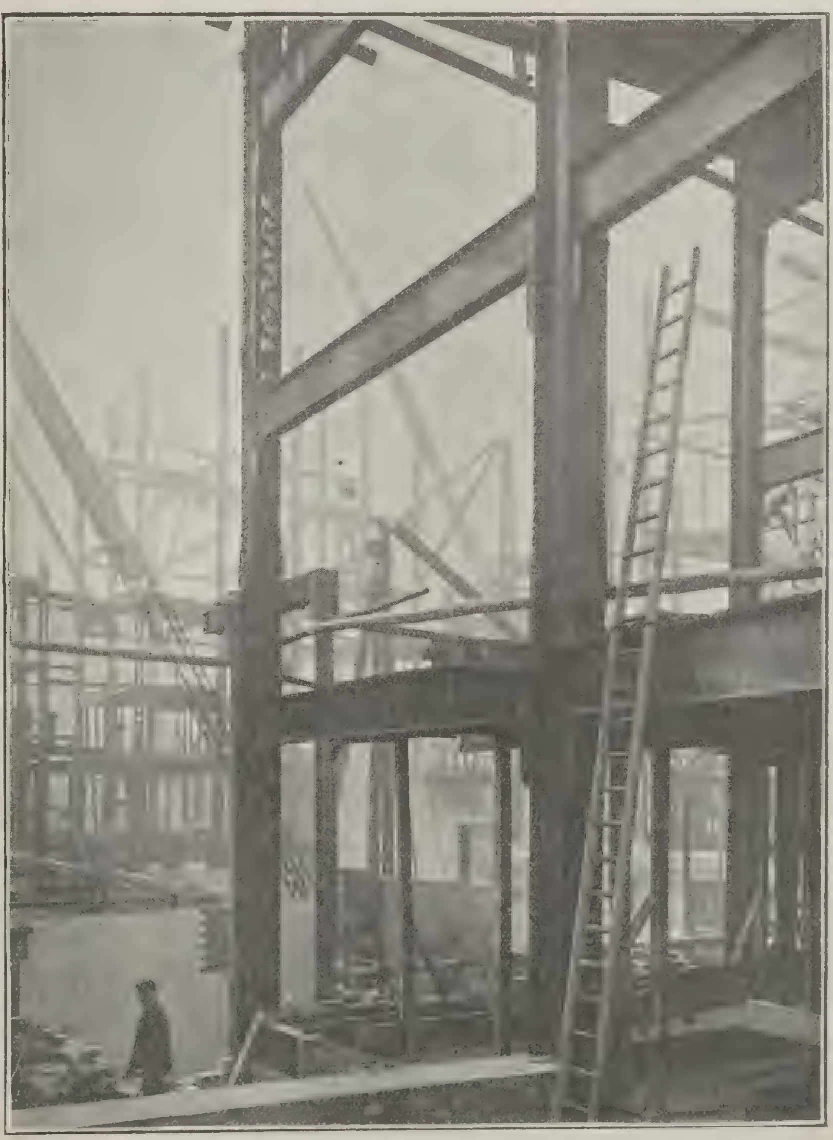
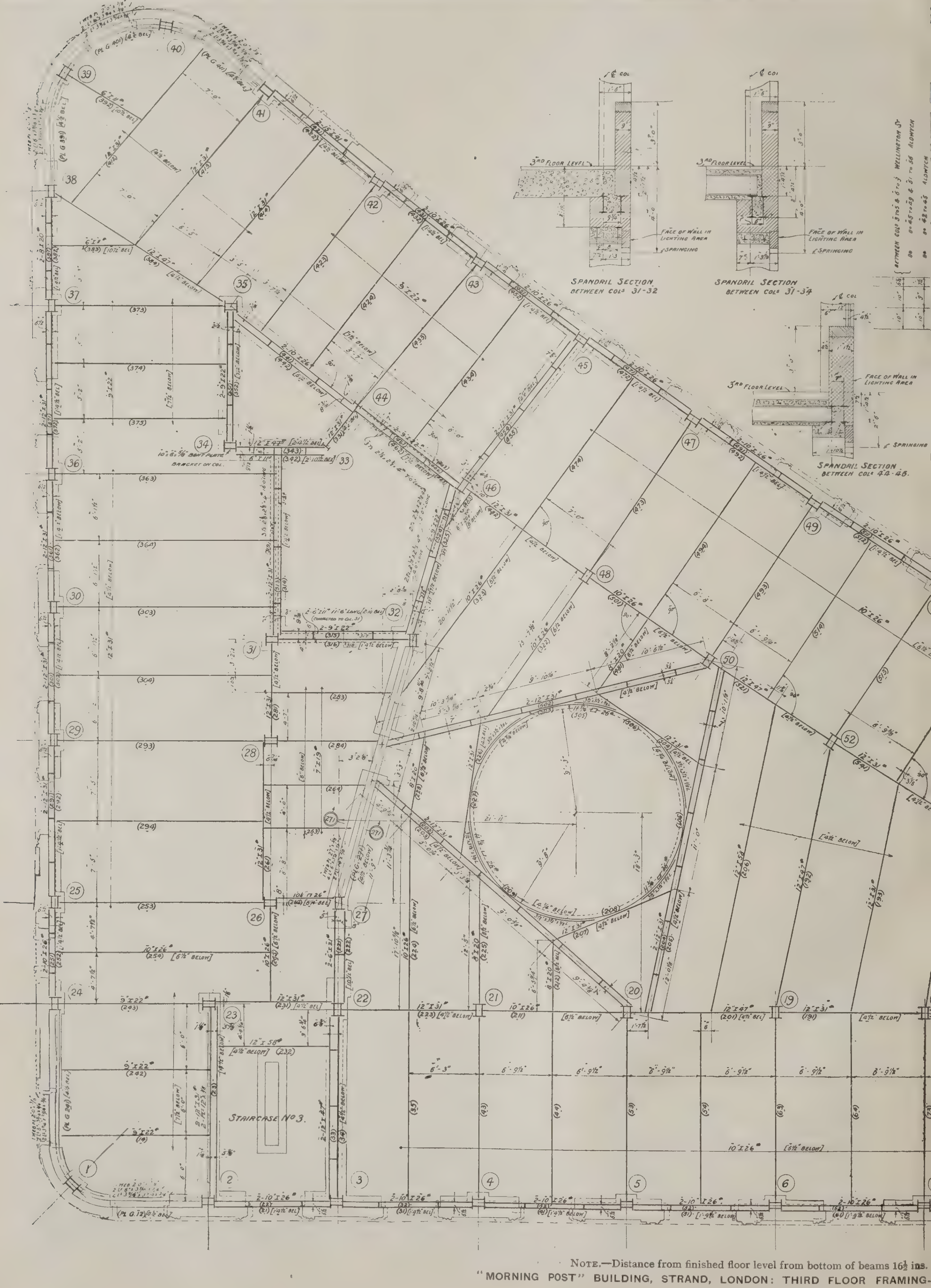
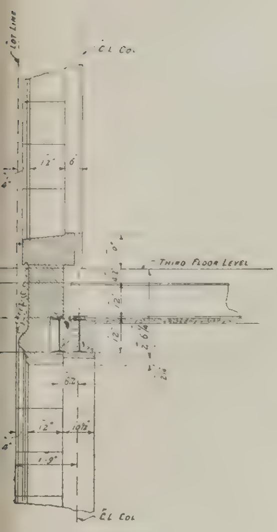


FIG. 4. PORTION OF STEELWORK AT WALDORF HOTEL.

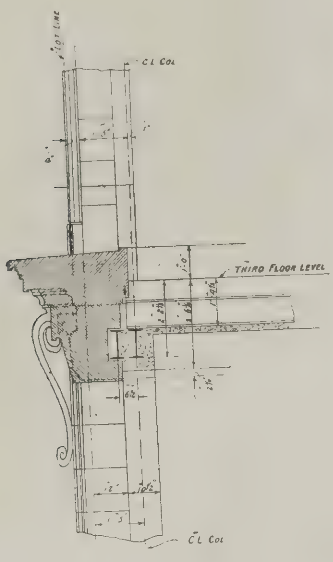


NOTE.—Distance from finished floor level from bottom of beams 16½ ins.

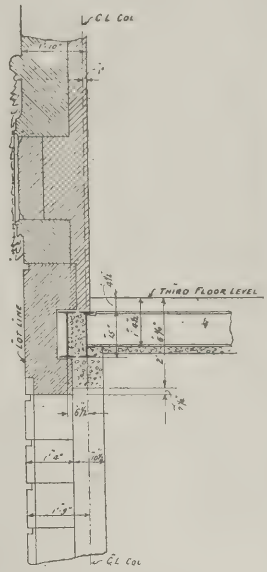
"MORNING POST" BUILDING, STRAND, LONDON: THIRD FLOOR FRAMING-



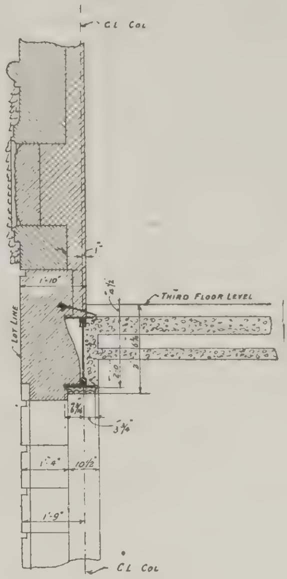
SPANDRIL SECTIONS
TWEEN COLS 25 TO 36 EXETER ST



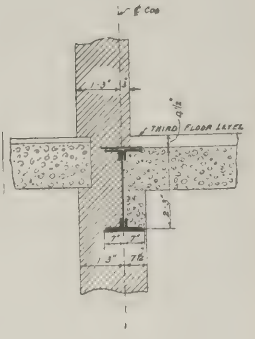
SPANDRIL SECTIONS
BETWEEN COLS 3-6 WELLINGTON ST
DO DO 49-51 ALDWYCH



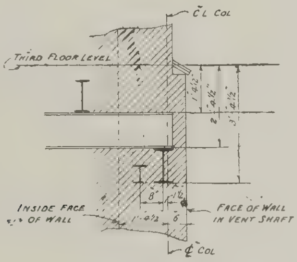
SPANDRIL SECTIONS
BETWEEN COLS 41 42 ALDWYCH



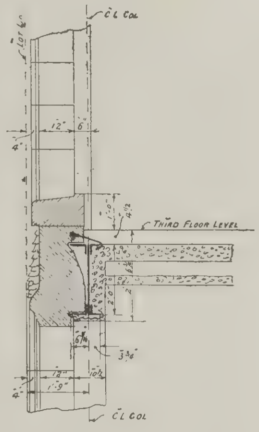
SPANDRIL SECTIONS
BETWEEN COLS 9-10 WELLINGTON ST
DO DO 13-36 ALDWYCH



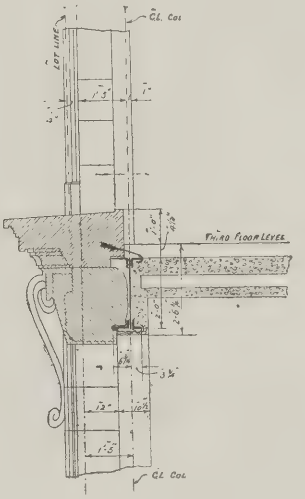
SECTION 271-271.



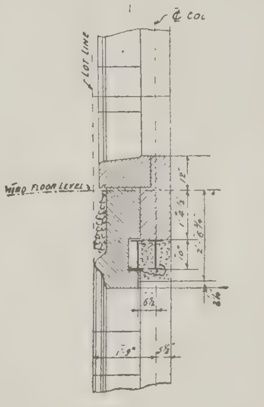
SPANDRIL SECTION
BETWEEN COLS 34-33.



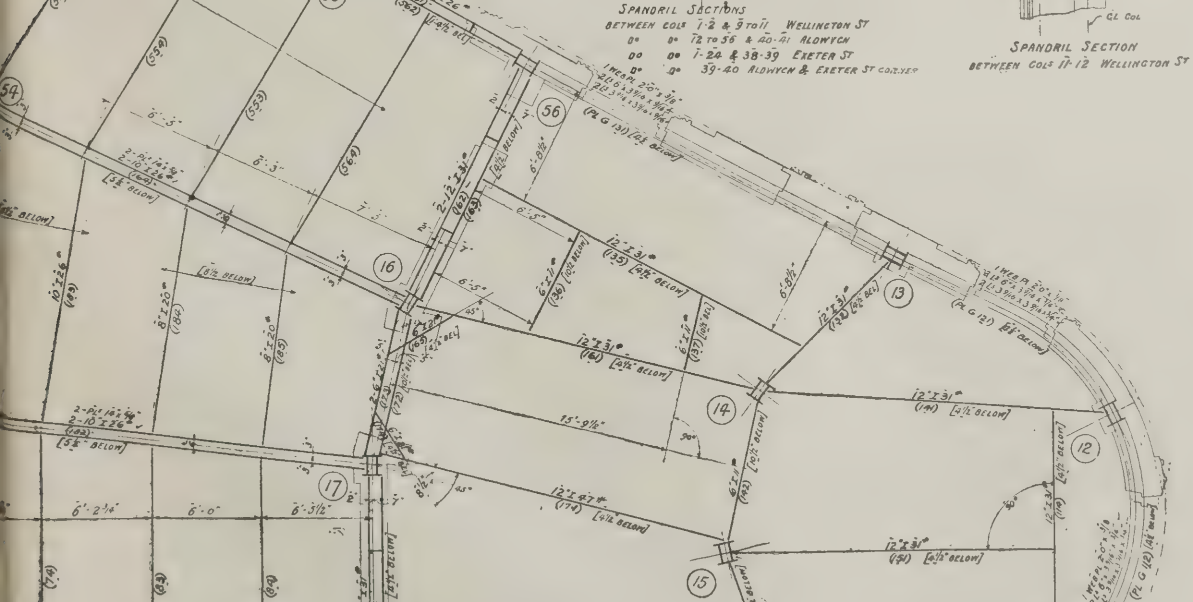
SPANDRIL SECTIONS
BETWEEN COLS 1-2 & 9 TO 11 WELLINGTON ST
DO DO 12 TO 56 & 40-41 ALDWYCH
DO DO 1-24 & 38-39 EXETER ST
DO DO 39-40 ALDWYCH & EXETER ST CORNER

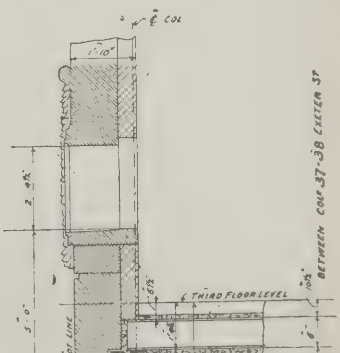


SPANDRIL SECTION
BETWEEN COLS 11-12 WELLINGTON ST & ALDWYCH CORNER



SPANDRIL SECTION
BETWEEN COLS 2-3 WELLINGTON ST.





SPANDRIL SECTIONS
BETWEEN COLS 24-25 EXETER ST

where otherwise shown on plans. Levels of beams are given to top of flange.

OF STEELWORK. MEWES & DAVIS, ARCHITECTS, S. BYLANDER, ENGINEER.

portions that may be inclined to swell, or that have escaped observation. It is a difficult matter to judge by appearance exactly the nature of aggregates, and for town buildings where no room for storing exists but delivery has to be day by day, it has in a large measure to be taken on trust.

Cracks.

It has been suggested—where expansion of concrete has taken place—that the aggregate expanded, and that certain aggregates are more liable to swell when water is added than others. I know of no evidence to this effect; in my own experience I have never found such to be the case, and the suggestion has possibly originated through the cracks that will sometimes occur in concrete from change of temperature, the theory being that when the concrete has become dry the aggregate has assumed its normal condition. When exposed to high temperature certain aggregates expand more than others; at a temperature of 32° to 212° the linear expansion of common brick, according to Hurst, is 1 in 1,818, limestone 1 in 1,322, and fire brick 1 in 2,365. In an ordinary way this difference has scarcely any effect on concrete, and does not as a rule carry much weight in the selection of an aggregate, which is guided usually by local circumstances.

Cement the Primary Cause of Failure.

The primary cause of most concrete failures is the nature of the matrix—now almost invariably Portland cement—and unfortunately the latter is one of the few building materials that cannot be judged to any extent by the most skilled expert from a cursory examination. Colour and weight were formerly held to be two features from which its character might approximately be estimated, but these are quite uncertain factors at the present time; fineness can be more readily ascertained, but this is insuffîcent evidence of quality; a bad cement can be ground as fine as a good one. Unfortunately, too, a fair estimate of its strength and quality can only be arrived at when tested after an interval of at least seven days, and better still fourteen or twenty-one days as being more reliable.

The Advantage of Storing Cement.

In large towns where users of cement are unable, for want of storage room, to stock any quantity, and where it is often required miles distant from their works, there is a saving of cost in cartage and unloading and reloading in having it direct from the manufacturers, or from one or other of their depôts or agents, and as the available space on new buildings is usually too restricted to store any quantity to season, it is frequently the case that cement is used immediately after or within a very limited period of its delivery.

A great deal of cement is supplied by builders' merchants who keep stocks of different manufacturers to suit the demands of customers who prefer certain brands to others. When the merchant is short of a certain kind it is well known that cement of another maker is often filled in the sacks of the brand ordered. Obviously the more reputable merchants do not practise this deception, and possibly it is done more in the smaller provincial towns where the demand is less.

Guarantees.

It would seem possible to have ties so made as to render it a difficult matter to tamper with the contents of the sacks without detection, as for instance ties with a coloured thread interwoven therewith as is practised—for identification—with Government rope. Some manufacturers now seal the ties, but something more simple seems desirable. Builders' merchants' clerks and storekeepers are often credited with "ringing the changes" when a certain brand of cement is inquired for and is not in stock, presumably in the interest of their employers, who possibly are unaware of what has been done. On one occasion, noticing a plasterer cementing the outside of a house, I enquired whose cement he was using, and he replied A's, but, he added, "I have had some delivered this morning in A's sacks which I feel sure is not A's cement." When the building was finished the tint of some portions was very different to others, to the plasterer's disgust.

Another difficulty

with the use of cement may lead to failure is that some manufacturers profess to make several qualities. This is a reprehensible custom. Wherever cement is used, and for whatever object, it is for some purpose where lime mortar is assumed to be not good enough, and upon the use of which great reliance has to be placed; the object is clear to everyone; cutting contracts necessitate cheap materials; one firm of manufacturers, and possibly others, state in their trade lists that they supply three qualities of cement —"first, second, and contractors'" qualities. The latter description is a libel on contractors who purchase the best.

How Many Contractors Have Testing Machines?

Now that Portland cement is largely employed over all the country, and is usually received from the manufacturers, their agents, or builders' merchants in small quantities at a time, it is impossible for the user to test, or have tested, each consignment as delivered. It would be interesting to learn how many cement testing machines and apparatus are employed by the users of cement on buildings, and for other purposes, or how many builders test their cement; the number of the latter would be out of all proportion to the number who do not.

In the larger class of buildings the clerk of works has ample duties to perform without testing cement, and it would seem to most people to be unnecessary to employ a man specially experienced in that direction, and so where it is supposed to be practised it is more often than otherwise a spasmodic operation.

DORMERS ON THE ALDWYCH FRONT OF "MORNING POST" BUILDING.

Where large engineering operations are in progress it is a different matter: testing cement is usually an important factor in the carrying out of the works.

Difficult to test quality.

So that it becomes difficult in a general way to ascertain whether the cement we are using is up to standard requirements or otherwise, and when we realise the confidence that has to be placed in its quality, and the possible fatal results which may occur from its failure, it is a serious matter to have to deal with.

The only way to ensure comparatively safe results is for manufacturers to test each batch of cement, say seven or fourteen days after it comes from the grinding mills, bag it up with some form of fastening that cannot be tampered with without detection, and send a copy of the test signed by the work's chemist with each consignment. Some firms are now practising this arrangement, and it would seem desirable that with a material so difficult to deal with, like some other articles of commerce its description should be made compulsory; the best makers should raise no objection—on the contrary, for it would weed the market of much of the cement with which no guarantee is given or expected, the only recommendation being the price.

With the perfected machinery

for making cement, and the aid of skilled chemists, there should be no reason for making an inferior quality, assuming that the raw materials are of the proper description, except the saving in cost which is out of all proportion to the difference in quality. Then there is the possibility of the inferior kinds being put into sacks branded as best, if branded at all—may be inadvertently; but where the same article is made in the same building, though of various qualities, and indistinguishable one from the other, the danger exists. That others beside the purchaser may not be aware of the quality it is sometimes the custom to give fanciful names to the different kinds which are branded on the sacks, such as "Cyclops cement," "Leviathan cement," &c.

If the sacks were simply branded 1, 2, and 3, denoting first, second, and third qualities, the meaning would soon be clear to other people beside the seller and purchaser.

There has been no end of varying opinions relative to the contraction and expansion of concrete. It may be safely assumed, I think, that the aggregate alone undergoes no change; possibly the addition of water may cause expansion in certain aggregates to an unmeasurable extent. Cement, on the other hand, usually expands slightly, and so therefore must concrete, unless we assume that its particles undergo slight compression arising from the action of the cement, and which is not improbable.

But with unseasoned and ill-conditioned cement there is no limit to the mischief of which it may be the cause, both to concrete and to brick walls built with cement mortar. It will fracture brick and stone walls up to two years after completion, and possibly longer—the former is within my knowledge. When the walls of buildings have been erected with cement morfar, and the floors are concrete, the cement for the latter being of a suitable description and the cement of the former the reverse (failures of this kind have occurred) the result is invariably put down to expansion of the concrete, and the floor contractor possibly becomes an innocent victim to damages.

If, however, the cement were of the same inferior quality for both walls and floors, the failure is obviously increased, as the latter assists in straining the walls or lifting the bricks off their bed. In walls of this character where there are possibly no concrete floors, and vertical cracks occur, more generally near the ends, or adjacent to window or door openings, where there is the least resistance, the foundations at those points are sometimes assumed to have sunk and underpinning has taken place.

Where the load or dead weight is diminished, as for instance near the top of parapet walls, or top of boundary and similar walls, they do not as a rule run the full length of the latter, but at irregular intervals and perhaps five to ten feet long, and when these are in evidence there is no question as to the cause. The pointing may be raked out and the joints repointed, but there is no certainty how long the latter will remain sound. The mischief is more in evidence where lead flashings are turned or tucked into the brickwork joints; if the cracks occur at these joints, rain invariably finds its way in the wall and down to the ceiling, or whatever may be under, and disfigures the walls, and at once the roof is said to leak.

Joints of floors with walls

I have known horizontal cracks of this character appear, when, for want of some better explanation, it has been suggested that the flat roof concrete has expanded sufficent to upheave the brickwork. Obviously the greater the proportion of sand the less liable is cement mortar to cause expansion.

When the floor contractor is not the general contractor, and the walls are built with cement mortar, it would save the former trouble, in case cracks appear in the walls, to insert wood expansion strips round all floors before commencing, as was the practice when plaster of Paris was the matrix, and removing them when the concrete was set, filling in the cavities with sand and calling the attention of the architect or clerk of works to what had been done and the motive thereof. The cost is trifling, and future troubles need not then interest the floor contractor; he has created his own exemption clause if the floors are said to be pushing the walls out.

In describing the causes of failure and the results, where expansion takes place, I admit that the general opinion is not altogether, if at all, the same as my own, but I am telling what has come under my own observation on numerous occasions for many years past, and not voicing the possibly general opinion.

Where large concrete floors are formed, the expansion, if ever so minute, should be seen in the mortar joints of the walls upon which the floors bear, but I have never found this to be the case where proper cement was employed; the most satisfactory trial of the kind in my own experience was with a number of floors 120 feet in length and 26 feet in width; some were formed between steel joists four feet apart, others rested on dwarf walls, and not the slightest sign of expansion was apparent four years after in any of these floors.

Where unseasoned cement has been used for floors and flat roofs expansion may not develop for months, or even for years, for the action of cement is very erratic, and often not easy of explanation.

The conclusion I arrive at

is—and I find it coincides with the opinion of others who have had much practical experience with concrete—that the latter expands slightly when first deposited in place, but that when the permanent set of the cement has taken place, say within 48 hours, it ceases, and as a large floor is usually some time in hand the bulk of the concrete has passed beyond the expansion stage before it is completed. How long it is before contraction takes place seems to be very uncertain, and when it does it is usually not of a serious character, unless mosaic or terrazzo is attached thereto. In many instances no contraction has been apparent at any time. These deductions are made on the assumption that the cement is suitable and the concrete is not exposed to climatic changes.

(To be concluded).

REINFORCED CONCRETE SYSTEMS—XI.

William Lindsay & Co.'s Trussed Rod and other Systems.

The founder of the firm, Mr. William H. Lindsay, was another of the pioneers in both the use of steel and of reinforced concrete in buildings. He started the Paddington Ironworks, which used to be situated at South Wharf, Paddington, and early turned his attention to fire-resisting floor construction. The records of the Patent Office show several inventions to his name, which are interesting inasmuch as they show the date of the discovery of various points in practical steelwork design that are now common property and matters of everyday usage. Thus, for instance, Mr. W. H. Lindsay took out a patent in 1882 for trough flooring, much used to this day in railway bridges. This he adapted to floors in buildings, as shown in Fig. 1. In 1888 his successor, Mr. William Lindsay, took out patents for various sections of steel stanchions.

Messrs. Lindsay and Co. have always been specialists in steel construction, and Fig 8 shows the interesting steel roof at Colchester Town Hall, which the firm designed for Mr. John Belcher, A.R.A., F.R.I.B.A. They also have had experience in steel-frame construction.

The Trussed Rod Floor Patent.

Mr. W. H. Lindsay's patent for his well-known system of concrete floor construction with trussed steel rods was taken out in 1885. This was the period of agitation in regard to fire-resisting construction, and doubtless Mr. Lindsay, as other patentees, had his attention strongly drawn to the subject by the public demand, and this patent was the result.

The essential features

of his system are shown in Figs 2 and 3. It will be seen that intermediate joists are used between main beams simply rested on riveted angles, with rods carried continuously over and under the joists, so as to form a kind of trussed or interlaced floor. These trussed rods constitute the difference in this system to the ordinary one where small joists are embedded in the concrete. The spans between the intermediate joists in such floors as we are considering are usually 2 feet. The section of the joists varies according to the load to be supported. The section of the continuous rods is uniformly $\frac{3}{16}$ ins., this size having been found most convenient for practical work, as thicker rods are somewhat difficult to easily bend for interlacing by hand.

Where wider spans between intermediate joists is desired, the concrete is arched. Two forms are adopted. Fig 4 shows one in which $\frac{3}{16}$ in. rods are used in much the same way as in the floor with flat soffites. In this case, however, the trussed rods are carried through holes in the webs of the beams. It will also be noticed that a trough-shaped section is riveted to the bottom flange of the joists with rods passed through it so as to hold the concrete round and protect this bottom flange. In this case the span is 14ft. As shown, this sustained a load of 8 tons in the centre. A similarly constructed arch 6ft. wide and 18ft. span, built with a coke-breeze, sand and cement concrete proportioned 5 to 1 was loaded with 7 tons in the centre as shown in this view without producing the slightest crack or discoverable flaw. Fig 5 shows the other method, where the rods are carried through holes in the web, and secured by bolts upon their ends; $\frac{3}{4}$-in. rods are adopted in such cases; the spans can extend to 12ft., and can be built to take loads up to 20cwts. per foot super.

Messrs. Wm. Lindsay and Co. use no theoretical calculation for determining the detail dimensions of such floors, and it cannot be seen how they well could. They have determined by tests and experience that the additional strength given by the trussed rods can be safely taken at 25 per cent. The Lindsay system is an empirical one, but it is

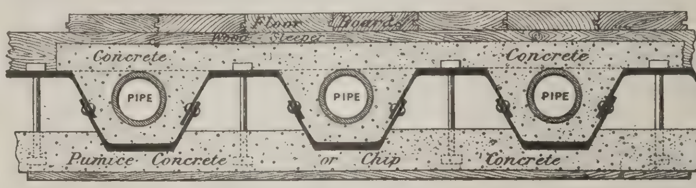


FIG. 1.

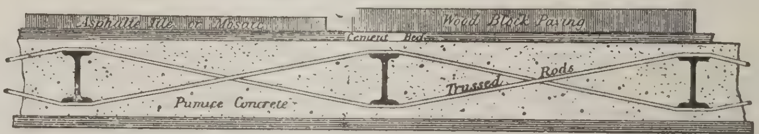


FIG. 2.

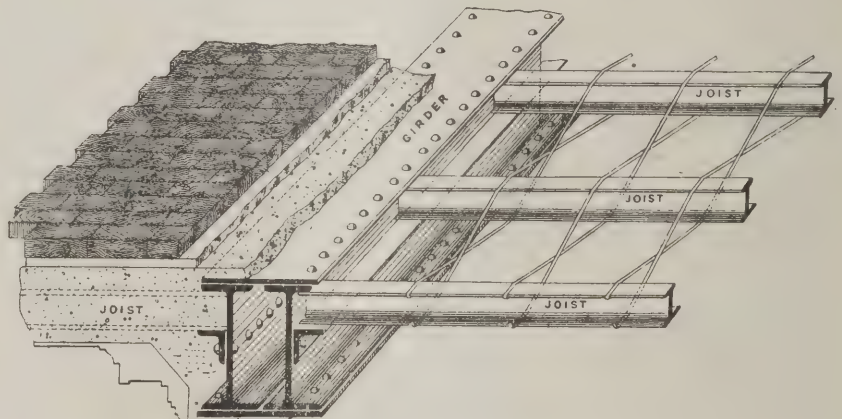


FIG. 3.

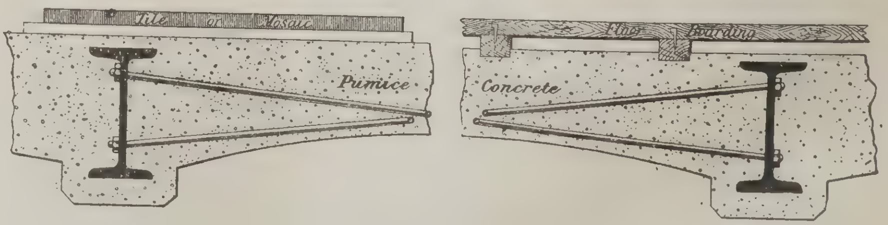


FIG. 5.

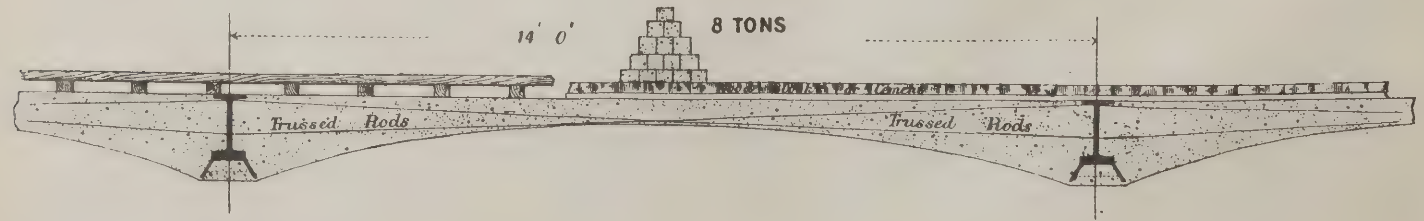
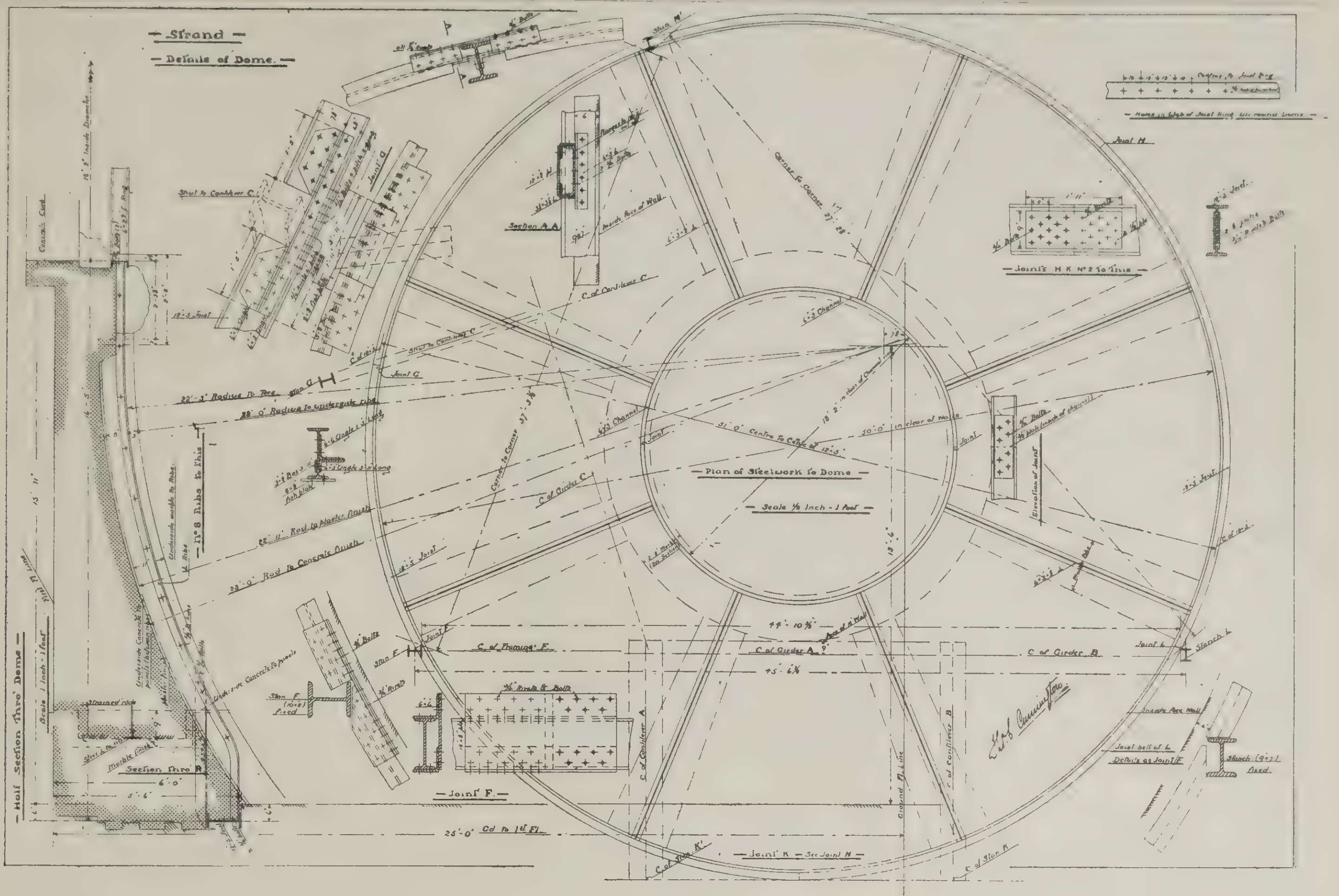


FIG. 4.



practical and economical, perhaps because of this very fact.

It is usual where Lindsay's trussed rod system is used for the floor construction to adopt a panelled ceiling, the main beams being encased in concrete to protect them against fire, and projecting below the ceiling line. This is capable of fine treatment, but sometimes, for architectural reasons or as an extra insurance of sound proofness, a level ceiling is required. Then a suspended ceiling on metal lathing is adopted. In this connection we may mention that Messrs. Wm. Lindsay and Co. built some hollow floors some years ago in hollow brick or tile construction, the hollow blocks forming the upper floor resting on the upper flanges of the beams, and the hollow ceiling blocks below resting on the bottom flanges. Messrs. Lindsay, indeed, at one period worked a hollow terra-cotta block system for floors and partitions.

At wall-end bays Messrs. Lindsay place a joist against the wall and turn the ends of the rods over the flanges, as shown in Fig. 3. Where the ends of the rods come in the middle of the floor they are just turned over in a similar fashion, but care is taken that they break joint, as it were, by being carried past each other in alternate rows.

There are no other details which need be mentioned as to the way in which Lindsay's trussed rod system is used in floor construction except that it may be stated that there is no special trimming required for floor openings. In such cases the opening is trimmed round with joists, the rods being hooked over these the same as they would be at wall-end bays.

It has been stated that the round wire generally used by Messrs. Lindsay & Co. is $\frac{5}{16}$ths. of an inch in diameter. This is made

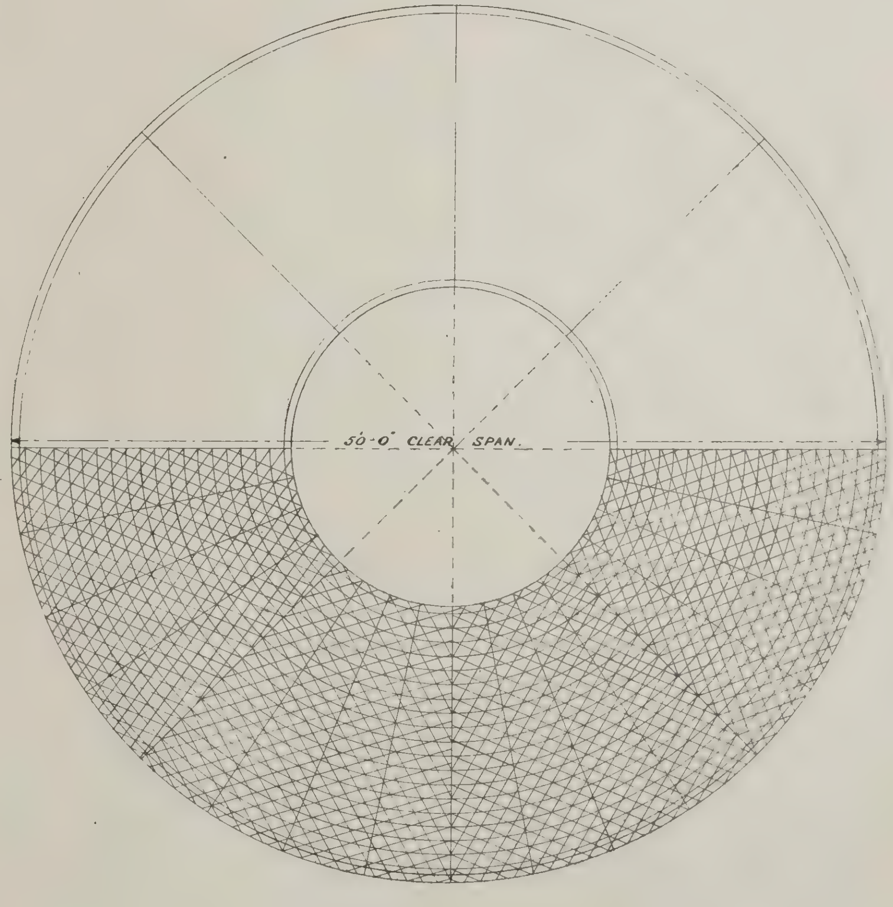


FIG. 6.

CONSTRUCTION OF DOME AT THE UNITED KINGDOM PROVIDENT INSTITUTION, STRAND, LONDON.

HENRY T. HARE, F.R.I.B.A., ARCHITECT.

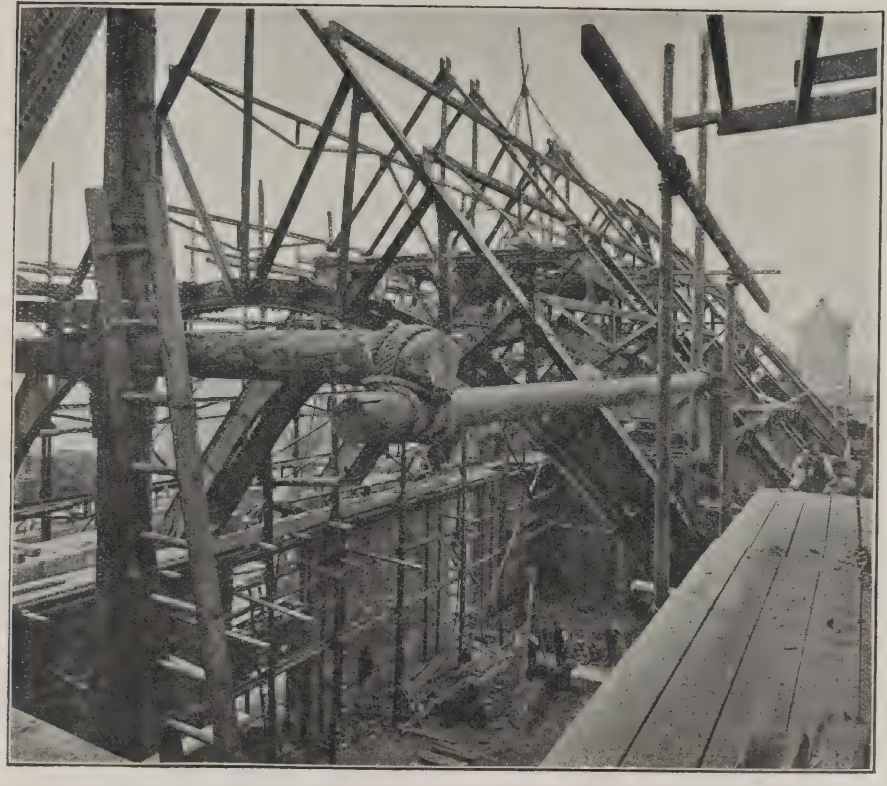


FIG. 8. ROOF AT COLCHESTER TOWN HALL.

of drawn steel, and consequently has a high elastic limit, as well as a high ultimate strength; therefore it offers a greater resistance to tension than does ordinary mild-steel, and the proportion of metal required is less than when mild steel is used.

Aggregates and Proportions.

Regarding the aggregates and proportions of the concrete, Messrs. Lindsay & Co. usually favour coke-breeze concrete, to which they have given the special name "pumice concrete." There is, however, no pumice stone in its composition. The proportions usually adopted are 5 of coke-breeze and sand to 1 of cement; namely, to a half-yard measure of coke-breeze, 1 bag of sand and 1 bag of cement are added.

Messrs. Lindsay & Co. are specialists in reinforced concrete construction generally, and do not confine themselves to reinforced concrete floors alone. As a rule they favour steel stanchions and beams in preference to columns or beams reinforced with rods alone. Thus their system of reinforced concrete construction is a combination one of ordinary steel sections and rods similar to those used for floor reinforcement. Their trussed system is not generally applicable apart from floors, and we therefore must call attention to the several ways in which the various parts of buildings are constructed.

As regards roofs,

in the case of both Mansard and ordinary pitched roofs the rafters consist of joists, while the rods are carried through holes in the webs and interlaced diagonally to form a meshwork, as shown in Fig. 7.

Domes.

Two or three domes have been carried out in reinforced concrete by this firm. We illustrate in Fig. 6 a dome at the United Kingdom Provident Institution which has just been completed in the Strand, London, opposite St. Clement Danes Church (Mr. Henry T. Hare, F.R.I.B.A., architect). Here again it will be seen that the rods are interlaced diagonally; in this case, however, further rods are placed concentrically and radiating to the centre. The diagonal rods are carried through holes in the T-irons forming the ribs of this dome, which is 50ft. span. The thickness of the concrete in the centre eye of the dome is 1ft. and 5ft. 6ins. at the outside rim.

Numerous fire-resisting ceilings

have been carried out by Messrs. Lindsay. We may refer, as an instance, to a barrel ceiling at the Islington Central Library. This is suspended from roof trusses somewhat similar to those shown in Fig 8, with $\frac{3}{16}$in. rods interlaced as above referred to, embedded in concrete 4ins. thick. Such ceilings offer admirable protection against fire.

Reinforced partitions and stairs

have also been executed by the firm.

Calculations.

Regarding the theory which should be applied to the calculation of Messrs. Lindsay's systems, evidently no difficulty is presented except so far as the trussed-rods are concerned. Any of the several variations of modern theory based on the elasticity of the materials can be applied. The special points to be noted, however, are that the use of high elastic limit steel will enable the proportion of metal to be reduced, and that we must decide as to what factor of safety shall be taken upon the steel. If a factor of 4 is taken upon its ultimate strength, in accordance with the usual custom, it will give a factor of safety of nearly 3 upon the elastic limit, which, after all, is really the limiting value in reinforced concrete construction; whereas ordinary mild steel gives only a factor of safety of 2 in regard to its elastic limit. As such a factor of safety of 2 is usually assumed to be adequate by the majority of engineers, there is no reason why it should not be applied to high elastic limit steel, but some engineers favour the adoption of a factor of safety of 4 on the elastic limit, but it certainly seems that 3 would be ample.

Contracts.

It should be noted that Messrs. William Lindsay & Co. carry out completely the construction of reinforced concrete and steel work without the intervention of a contractor. This they claim is an advantage, in so far as their experience in the supervision and the services of experienced workmen in their employ are obtained, while they become directly responsible, therefore giving a better guarantee of the the efficiency of the workmanship.

The following is a list of a few buildings in which the floors have been constructed upon Lindsay's trussed-rod system:—

The Church House, Westminster.
Royal Infirmary, Liverpool.
London Hospital Extension.
Oxford Municipal Buildings.
Borough of Shoreditch Library and Baths.
County Council Buildings, Stafford, and Extension to same.
Presbyterian College, Cambridge.
Gymnasium, etc., Kingham Hill, Oxon.
West Australian Bank, Cornhill.
Messrs. Bryant & May's New Factories, London, E.
Messrs. Jones & Higgins, New Premises, Peckham, London, S.E.
New Hospital, St. John's Wood, London.
Messrs. Morgan & Co.'s Carriage Works, Long Acre, London, W.C.
Shops, Flats, etc., Mortimer Street, W.
Public Baths, Walthamstow, London.
Concert Hall and Co-opetative Stores, Burton.
Woollen Warehouses, Huddersfield.
Public Library, Johannesburg.
Consolidated Investment Co.'s Buildings, Jubert Street, Johannesburg.
Colchester Town Hall.
Henley Town Hall.
Electra House, Finsbury Pavement, London.
Wolverhampton Public Library.
United Kingdom Provident Institution, Strand, London.

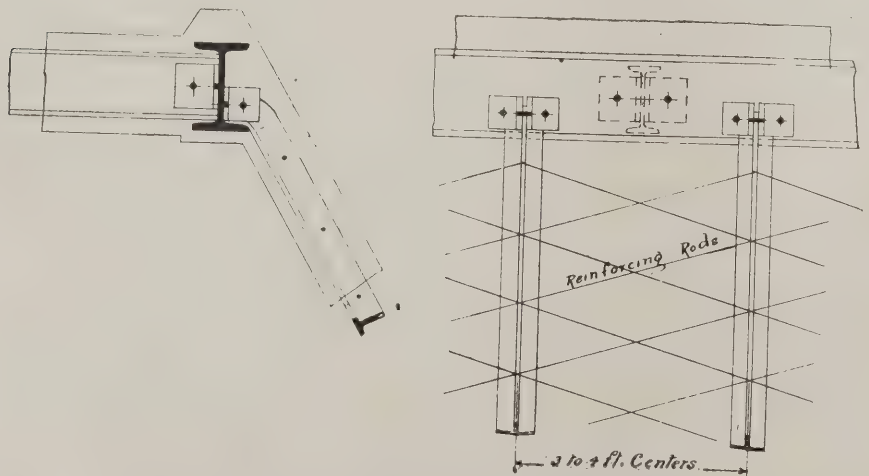


FIG. 7. DETAIL OF MANSARD ROOF CONSTRUCTION.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
March 27, 1907.
CONCRETE AND STEEL SUPPLEMENT (MONTHLY).

SPIRALLY REINFORCED CONCRETE AND ITS APPLICATION.

By A. Considère, Inspecteur-Général des Ponts et Chaussées (retired).

Introduction.

The reinforcements of "béton fretté" consist essentially of metal hoops or helicoidal spirals placed sufficiently far from the surface to be protected from external causes of alteration. The object of these is to resist the lateral swelling of the concrete without which crushing cannot result. Practical or accessory considerations generally lead to the completion of the enveloping network by longitudinal bars. (Fig. 1.)

The first published communications respecting the properties of spirally reinforced concrete, or "béton fretté," appear to be those I made in 1902. On August 25th and September 8th of that year, I contributed communications on that subject to the Academy of Sciences, and I published a lengthy note in "Le Génie Civil," volume 42.

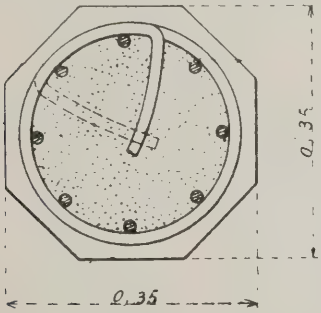


FIG. 1. SECTION OF A SPIRALLY REINFORCED PILE.

The "Annales des Ponts et Chaussées," of 1903, volume 3, contains the record of the test to destruction on a bow-string truss bridge of 20-metres span, which had been constructed in "béton fretté" in the yard of the Ivry-Orleans Railway Station, Paris.

Since then "béton fretté" has been the subject of numerous experiments in the laboratories of the Ecole des Ponts et Chaussées, the Conservatoire des Arts et Métiers, and of the Technical Schools at Stuttgart, Turin, and Zurich, and also in the laboratory of the Artillery Arsenal at Turin.

Since 1904, this new material has received important applications, notably in France, Switzerland, Austria, Belgium, and Germany.

The time has now come to make known the results obtained, which confirm the previously published conclusions. Another consideration suggests the publication of this article. "Béton fretté" has its place in the instructions and the circular that the Minister of Public Works issued on October 20th, 1906, to the engineers in the Department of "Ponts et Chaussées," which instructions are in accordance with the proposals of the Commission on Reinforced Concrete.

The report of this Commission embodies the proofs which, although very lengthy, are far from comprising all the facts necessary for a complete study of this question.

The author wishes to give in greater detail the facts and the considerations which appear to him to justify the proposals of the Commission on Reinforced Concrete.

One cannot give a complete idea of the services to be rendered by "béton fretté" without comparing its resistance and its qualities to those of reinforced concrete conforming to the types which are employed by the majority of constructors. To avoid any criticism, that comparison must be based only upon the direct results of experiments chosen from those which are most reliable. Experiments have only been considered as such which have been made in public laboratories, of which the complete results have been published, and which have been carried out on parallel series of pieces reinforced in the ordinary way, or spirally reinforced, and pieces made of the same concrete without reinforcement, all having exactly the same sections and the same lengths. The work of the Commission on Reinforced Concrete has proved that the results can only be accurately compared under these conditions.

In order to clearly explain the special character of this accuracy, the author has made it the object of a special chapter in the course of the present article. In the second chapter have been recorded other experiments carried out with the same care as the before-named, but in which the plain concrete test-pieces did not conform to all the necessary conditions in being exactly comparable with the reinforced pieces. Following this the necessary considerations for the purpose of deducing from the experiments, the methods of calculation for pieces spirally reinforced, are dealt with, the advantages which can be obtained from the employment of this new material being demonstrated, and indications given of some of the applications which have already been made.

Chapter 1.—Direct Results of Comparable Experiments.

Most of the experiments have been made in the laboratory of the Ecole des Ponts et Chaussées, under the direction of the Commission on Reinforced Concrete. Detailed reports of them are to be found in a volume which has been published by Messrs. Dunod and Pinat, under the title "Commission du Ciment Armé: Expériences, rapport et Propositions. Instructions ministérielles relatives au béton armé." The other experiments have been made by Professor Bach at the laboratory of the Higher Technical School, Stuttgart. The results have been published under the title, "Druckversuche Mit Eisenbeton-korper."

Table I. gives the necessary information on the composition and making of the experimental posts, and on the results which were obtained. The first seven columns need no explanation. In column No. 8 is given the increase of the total resistance per square centimetre of the concrete produced by the metal reinforcement. This has been obtained by comparing the difference between the ordinary reinforced or spirally reinforced posts and the plain concrete test-pieces. In order to determine the work performed by the metal in the test-pieces, it will be sufficient to divide the corresponding number in column No. 11 by the percentage of metal. The quotients of these divisions are recorded in column 9.

It is well to remark that for a prism which contains only longitudinal reinforcement the co-efficient in question will be equal to the increase of resistance produced by these longitudinal bars, and recorded per square millimetre. That is the form under which it is customary to calculate the effect of the reinforcement.

If in every case we wish to gain a definite idea of the meaning of the co-efficient adopted, it will be sufficient to remark that it represents the increase of resistance of the concrete which would be produced per square millimetre of its section by a longitudinal prismatic bar, of which the volume would be equal to the total sum of the volumes of all the reinforcements.

With this explanation the table will be easily understood.

The first part of the table relates to prisms reinforced according to the usual methods, by longitudinal bars coupled together by tie-pieces or links. The prisms tested at Stuttgart were made according to the programme that the "Eisenbeton-ausschuss der Jubiläumstiftung der Deutschen Industrie" had worked out in order to determine the dispositions convenient for adoption for the reinforcement of pieces under compression. In the experiments made at the laboratory of the Ecole des Ponts et Chaussées on posts reinforced with longitudinal bars with tie-pieces, the reinforcements have been given the various dispositions indicated in the table.

The second part of this table relates to the results of experiments made on prisms spirally reinforced, fulfilling the conditions which, since 1902, have been recognised and indicated as necessary in order to secure the efficiency of the spiral reinforcement.

However, from the point of view of execution, it is necessary to explain the following facts:—The posts tested at Stuttgart were made by the firm of Wayss and Freytag. Before employing spirally-reinforced concrete in their work, this firm thought it necessary to themselves make several series of prisms of various kinds spirally reinforced, and to have them tested at Stuttgart by Professor Bach. In doing so, they had in view two important points: firstly, they wished to prove whether it was really necessary for the success of the spiral reinforcement to conform to the conditions which the author has previously referred to, and with this object they had made a series of prisms which did not fulfil these conditions, and, among others, the prisms referred to in the third part of the above table; secondly, they wished to determine the minimum resistance which could be relied upon in practice, having regard to the inevitable defects in construction; for this purpose test-pieces without special supervision were made by inexperienced workmen who had never done such work before. The firm's object was more than attained, for Professor Bach noticed that the distance apart of the spirals was extremely irregular, varying, for example, from 12 to 75 millimetres in the same piece, and that the distance from axis to axis of the longitudinal bars varied from 35 to 125 millimetres.

As against this, all the pieces ordinarily or spirally reinforced which were tested at the laboratory of the Ecole des Ponts et Chaussées, were made with great care by experienced workmen supplied by M. Grouselle, licensed contractor of the Hennebique system.

To these particular remarks may be added the general observation that whatever care is given to the making of the concrete, and to its use, the quality will vary from one piece to another, and may even differ notably in one reinforced piece and another plain test-piece. This gives rise to some uncertainty as to the effects produced by the reinforcement, and for this very reason one must regard with considerable suspicion the figures which vary from the average.

With this explanation, a simple inspection of the table will make clear the following facts :—

I.—Pieces Armoured Longitudinally.

No. 1.—In five long posts which were reinforced with percentages varying between 0.28 and 3.97, the metal added nothing to the resistance of the concrete.

TABLE I.—RESULTS OF COMPRESSION TESTS.

1	2	3	4	5	6	7	8	9
							Increase of resistance.	
No.	No. of Tests.	Section in square centimetres.	Longitudinal reinforcement.	Transverse reinforcement.	Position of the ends of the longitudinal bars.	How the Concrete was made.	Total.	Per sq. millimetre of the effective section of the metal.
I.—Posts Reinforced Longitudinally.								
A.—First Series of Experiments of the Commission. Posts 4 metres long.								
							Kilogrammes.	
1	5	Square 25×25 or 40×40	4 bars—size 12 to 45 mm.	Flat tiepieces of 70×3 mm. spaced 300 mm. apart	Placed at 7 mm. from the ends and bared	Rammed with care	0	0
B.—Experiments at Stuttgart. Posts 1 metre long.								
2	3	Square 25 × 25	4 bars—size 15 mm.	Links in rounds of 7 mm. spaced 250 mm. apart	To within 50 mm. of the ends and embedded in the concrete	Rammed	27	15·8
3	3		4 bars—size 15 mm.	Do. spaced 62·5 mm. apart			64	19·4
4	3		4 bars—size 30 mm.	Do. spaced 250 mm. apart			49	10·5
C. Second Series of Experiments of the Commission. Posts 1 metre in length.								
5	2	Square 20 × 20	4 bars—size 18 mm.	Flat tiepieces of 40×3 mm. paced 330 mm. apart	Bars exactly flush with bottom of post	Poured	30	9·4
6	2		Do.			Rammed with care	76	24
D.—Third Series of Experiments of the Commission. Posts 2 and 4 metres long.								
7	2	Square 18·2×18·2	8 bars—size 15 mm. length 2 metres	Tiepieces of 40 × 3 mm. spaced 333 mm. apart	To within 2 or 3 mm. of the ends and embedded in the concrete	Rammed—350 K cement*	82	16·6
8						Do. 500 K do.	102	20·7
9	2	Do.	8 bars—size 9 mm. length 4 metres	Tiepieces of 35 × 3 mm. spaced 333 mm. apart		Do. 350 K do.	22	10·4
10						Do. 500 K do.	67	31·2
II.—Posts Spirally Reinforced in conformity with Article 31 of Ministerial Circular.								
B¹.—Experiments at Stuttgart. Posts 1 metre long.								
11	3	Octagon of 27·5 cm. diameter	8 bars—size 11 mm.	Spirals of 5 mm., 37·8 mm. pitch	Spirals and longitudinal bars stopped 25 mm. from the ends	Rammed	93	51·0
12	3	Do.	Do.	Spirals of 7 mm., 37·8 mm. pitch		Do.	97	41·0
13	3	Do.	Do.	Spirals of 10 mm., 43·8 mm. pitch		Do.	148	44·5
C¹.—Second Series of Experiments of the Commission. Posts 1 metre long.								
14	2	Square 20×20	6 bars—size 9 mm.	Spirals of 6 mm., 20 mm. pitch	Reinforcement exactly flush with bottom of post	Poured	170	57·0
15	2	Do.	Do.	Do.	Do.	Rammed	166	55·5
D¹.—Third Series of Experiments of the Commission. Posts 2 to 4 metres long.								
16	2	Octagon of 20 cm. diameter.	6 bars—size 10 mm. length 2 metres.	Spirals of 6 mm., 10 mm. pitch	To within 2 or 3 mm. of the ends and embedded in the concrete	Rammed—350 K cement	270	42
17						Do. 500 K do.	287	45
18	2	Do.	Do.	Spirals of 6 mm., 14 mm. pitch	Do.	Do. 350 K do.	283	51
19						Do. 500 K do.	274	55
20	2	Do.	Do.	Spirals of 8 mm., 25 mm. pitch	Do.	Do. 350 K do.	188	38
21						Do. 500 K do.	257	52
22	2	Do.	6 bars—size 9 mm. length 2·3 metres	Spirals of 6 mm., 19 mm. pitch	Do.	Do. 350 K do.	207	55
23						Do 500 K do.	232	62
24	2	Do.	6 bars—size 8 mm. length 2·6 metres	Spirals of 6 mm., 24 mm. pitch	Do.	Do. 350 K do.	157	53
25						Do. 500 K do.	166	56
26	2	Do.	6 bars—size 7 mm. length 3 metres	Spirals of 6 mm., 30 mm. pitch	Do.	Do. 350 K do.	81	34
27						Do. 500 K do.	131	56
28	2	Do.	6 bars—size 8 mm. length 4 metres	Spirals of 6 mm., 45 mm. pitch	Do.	Do. 350 K do.	108	52
29						Do. 500 K do.	119	58
30	2	Do.	Do.	Spirals of 5 mm., 30 mm. pitch	Do.	Do. 350 K do.	89	44
31						Do. 500 K do.	126	63

* Where proportions of concrete are stated as so many kilos of cement, reference is made to the weight of cement per cubic metre of aggregate.

TABLE II.

I.—Posts Reinforced Longitudinally.

1	2	3	4	5	6	7	8	9	10	11
	Concrete.		Various Reinforcements.			Total Load.		Difference.		
				Resistance.					In Rate Per Cent.	
No.	Section in Sq. Centimetre.	Resistance of Plain Test Prisms.	Equivalent Section.	Per Square Centimetre.	Total.	Calculated.	Observed.	In Weight.	Increase.	Decrease.
2	618	86,800	10·4	2,400	24,960	111,800	104,000	− 7,800	—	7·5
3	Ditto	Ditto	20·2	Ditto	48,480	135,300	126,800	− 8,500	—	7
4	Ditto	Ditto	28·6	Ditto	68,640	155,400	117,000	−38,400	—	32
5	400	38,600	12·7	Ditto	30,500	69,100	49,600	−19,500	—	39
6	Ditto	63,300	12·7	Ditto	30,500	93,800	93,900	+ 100	·1	—
7	332	80,500	16·4	Ditto	39,400	119,900	107,800	−12,100	—	11
8	Ditto	61,200	16·4	Ditto	39,400	100,600	95,300	− 5,300	—	5·6
9	Ditto	65,800	7·1	Ditto	17,000	82,800	73,200	− 9,600	—	13
10	Ditto	48,800	7·1	Ditto	17,000	65,800	70,900	+ 5,100	7·3	—

II.—Posts Spirally Reinforced.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	CONCRETE.			LONGITUDINAL BARS.			SPIRALS.			TOTAL LOAD.		DIFFERENCE.		
	Section of Core.	Resistance of the Concrete.			Resistance.			Resistance.					IN RATE PER CENT.	
	S.	Plain Test Pieces per Square Centimetre. R.	Total Calculated 1·5S×R	Section.	Per Square Centi-metre.	Total.	Section.	Per Square Centimeter.	Total.	Calculated.	Observed.	In Weight.	In-crease.	De-crease.
11	452	133	90,100	7·6	2,400	18,200	3·9	5,100	17.900	126,200	142,000	+15,800	11	—
12	442	133	88,200	7·6	Ditto	18,200	7·78	Ditto	39,700	146,100	144,000	− 2,100	—	1·5
13	432	133	86,200	7·6	Ditto	18,200	13·49	Ditto	68.800	173,200	176,200	+ 3,000	2	—
14	225	96·5	32,600	3·8	Ditto	9,100	11·9	Ditto	60,700	102,400	105,500	+ 3,100	3	—
15	225	158	53,300	3·8	Ditto	9,100	11·9	Ditto	60,700	123,100	129,800	+ 6,700	5	—
17	266	184	73,400	4·7	Ditto	11,300	16·3	Ditto	82,100	167,800	156,500	−11,300	—	7
19	266	184	73,400	4·7	Ditto	11,300	11·6	Ditto	59,200	143,900	152,000	+ 8,100	5	—
23	266	178	71,000	3·8	Ditto	9,100	8·6	Ditto	43,800	123,900	136,000	+12,100	9	—
25	266	172	68,600	3·0	Ditto	7,200	6·8	Ditto	34,600	110,400	112,300	+ 1,900	2	—
27	266	164	65,400	2·3	Ditto	5,500	5·4	Ditto	27,500	98,400	98,700	+ 300	0	—
28	266	198	78,900	3·0	Ditto	7,200	3·6	Ditto	18,300	104,400	101,500	− 2,900	—	3
29	266	147	58,600	3·0	Ditto	7,200	3·6	Ditto	18,300	84,100	88,500	+ 4,400	5	—
30	266	147	58,600	3·0	Ditto	7,200	3·7	Ditto	18,800	84,600	90,700	+ 6,100	7	—

It is evident this was due to the fact that at each end of the longitudinal bars the concrete which covered them had been chipped out, and in doing so a space of 7 millimetres had been made between the extremity of the bar and the ram of the hydraulic press. This resulted in some longitudinal slipping of the reinforcing bars in the concrete. The results of these tests must be rejected as abnormal to the average results, but they show the danger attached if the extremities of the armature under compression are not properly covered.

Nos. 2, 3, 4.—The experiments made at Stuttgart have proved that the longitudinal bars gave ever so much more resistance to the concrete as their relative diameters were less in comparison with the section of the concrete, and when they were better tied or linked together. The spacing of the links has been reduced to one-quarter the diameter of the post, and in this case, which is the most favourable, the co-efficient was 19.4 kilograms.

Nos. 5, 6.—In order to make the armatures of these posts in the most perfect condition, their extremities were planed and they were exactly fitted against the ram. It is important to note in that series the great difference in the effects produced by the same armatures according to the different quality of concrete; we shall return to this later.

Nos. 7 to 10.—These pieces had been prepared under conditions which were not at all peculiar, except in the differences in the proportion of the cement.

II.—Posts Spirally Reinforced.

The difference between the execution of the spirally reinforced prisms tested in Stuttgart and Paris has already been pointed out.

Nos. 14 to 15.—The difference in the quality of the concrete did not have the same effect on the reinforcements as in those pieces reinforced longitudinally—in fact, it had no effect at all.

Nos. 16 to 31.—The tests of this series have been made on posts of 20 centimetres diameter, of which the lengths varied from 2 to 4 metres. The principal object of the tests was to determine the laws of lateral flexure; the figures in regard to which for Nos. 20, 26, and 30 relate to those posts which were bent without being crushed. They are less, therefore (one cannot say by how much), than the crushing resistance, and it follows that they are not comparable with the other figures of the table.

III.—Posts Spirally Reinforced according to Defective Dispositions.

Some tests were carried out on pieces (made by the firm of Wayss and Freytag), having the spirals spaced too far apart. The results were similar to those for posts reinforced longitudinally. Further tests were made on other pieces in which the longitudinal reinforcements were insufficient; these gave better results, but they were still mediocre.

The reader will see later that it is possible to do away completely with the longitudinal bars, but under the condition that the spirals are very closely spaced, so forming a network close enough to prevent the lateral escape of the concrete.

Having given this explanation, it only remains to compare the co-efficients of the useful work done by the metal (see last column).

For the posts reinforced longitudinally, we find an average of about 17 kilogrammes if we neglect the co-efficient for the first 5 posts, which is zero, and retain the figure of 31.2, which was much beyond the average.

For the posts spirally reinforced, in accordance with the regulations suggested by the Commission on Reinforced Concrete, the average value of the co-efficient is 50 or 53, according as we take into consideration or not the posts which failed by lateral flexure.

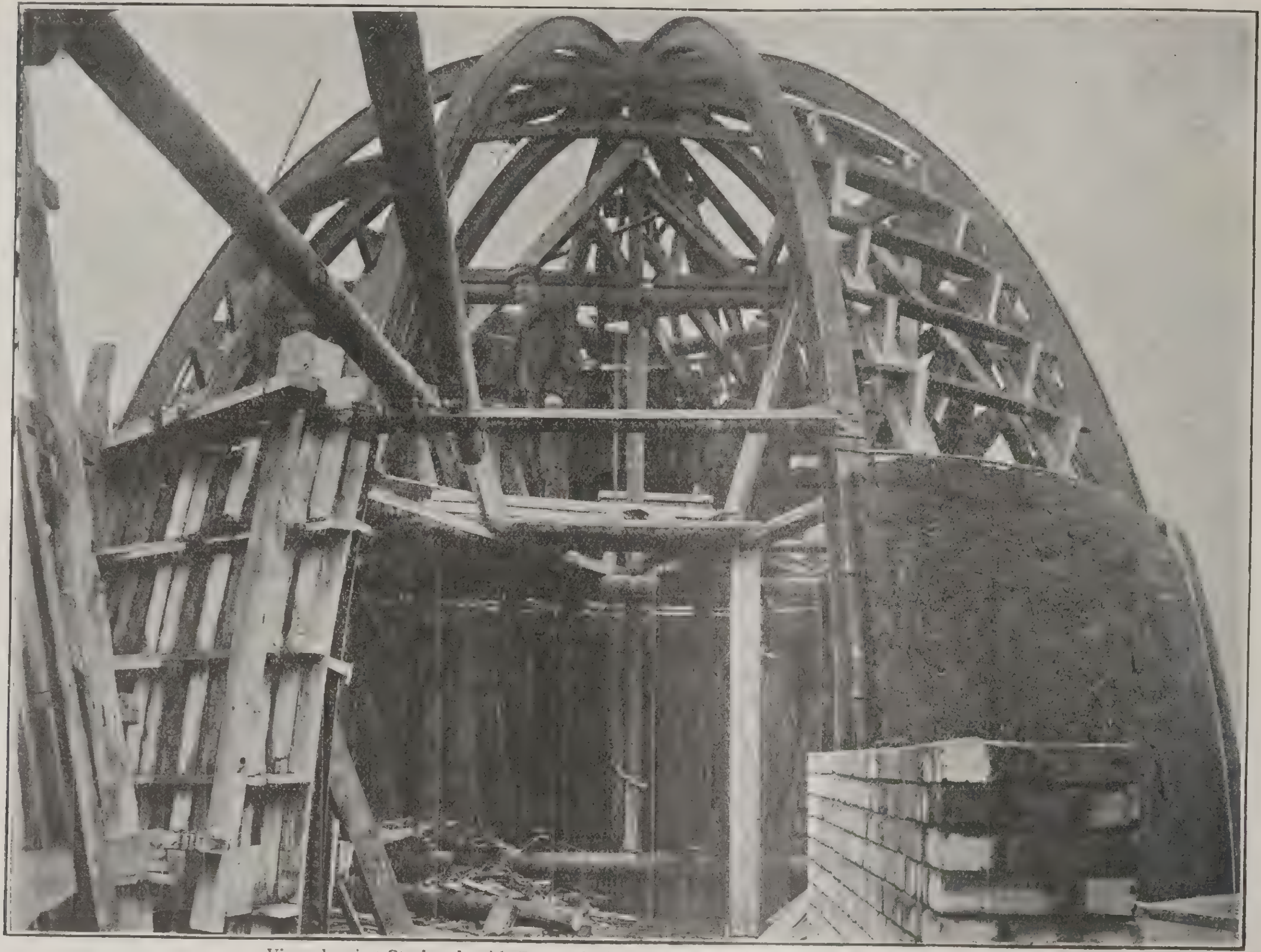
Hence, we are able to say that for the posts studied in this chapter the work of all the armatures together has been, on the average, three times greater in the pieces spirally reinforced than in those which were reinforced by longitudinal bars connected with tie-pieces or links.

It is well to remark also that the effect of the reinforcements has been much more regular in the pieces spirally reinforced than in the others, despite the faulty workmanship. Between the averages and the minimums the greatest difference (which is very important) is 45 per cent. for one type and 23 per cent. for the other.

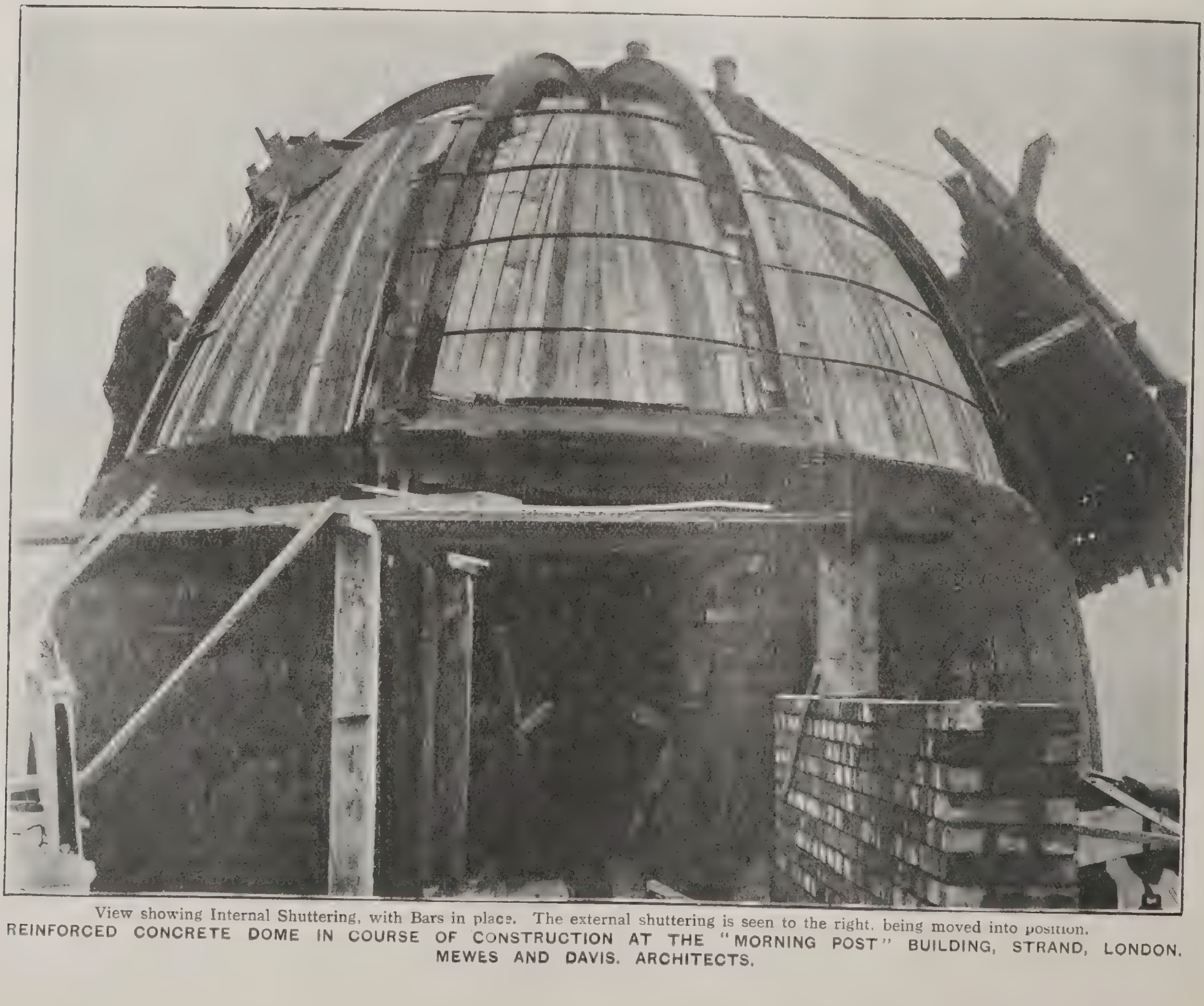
Such are the results of the various series of experiments made on 57 pieces fulfilling the conditions necessary to ensure results as certain as possible.

(To be continued.)

Change of Address and a New Contract.—Owing to the development of M. Edmond Coignet's English business extensive offices have been taken in 20, Victoria Street, Westminster, S.W., which will be his address for the future. The local licensees of the Coignet system, Messrs. Watt Brothers, of West Hartlepool, have secured the contract for the new extensive ore sheds for the Central Zinc Company, Ltd. They are at present in course of erection at Seaton Snook, near West Hartlepool. The general dimensions are 300ft. long and 46ft. wide. They are to be entirely in armoured concrete in the Coignet system.



View showing Steelwork with External Shuttering, and Portion of Concrete Completed.

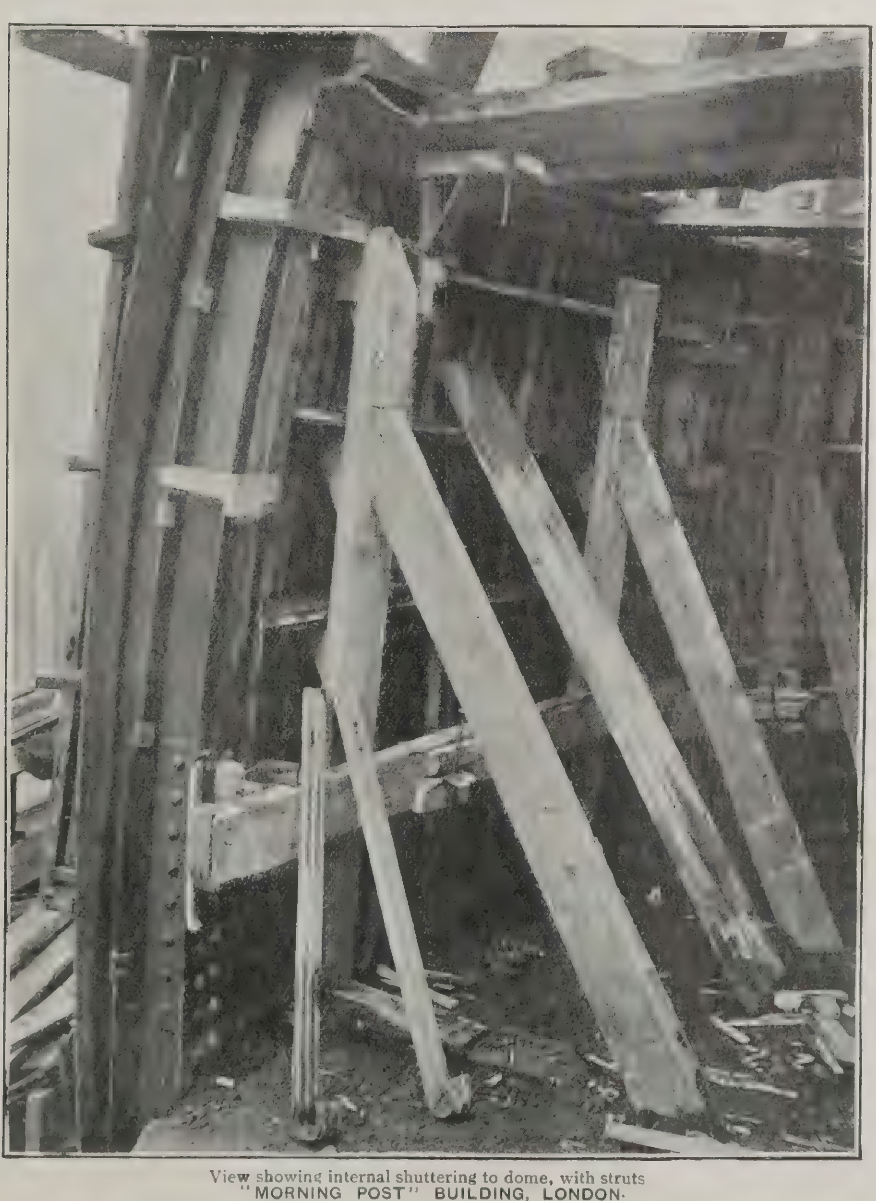


View showing Internal Shuttering, with Bars in place. The external shuttering is seen to the right, being moved into position.

REINFORCED CONCRETE DOME IN COURSE OF CONSTRUCTION AT THE "MORNING POST" BUILDING, STRAND, LONDON.
MEWES AND DAVIS, ARCHITECTS.

DOME AT THE "MORNING POST" BUILDING.

We publish herewith three views illustrating the construction of the dome on the new "Morning Post" building at the corner of Aldwych and the Strand, London. This dome is constructed of reinforced concrete on the Columbian system. The main members constitute a steel framework, between which the well-known cruciform Columbian bars are suspended by means of stirrups. These bars are clearly shown in position in one of the views on the opposite page, prior to the concrete being deposited round them. An internal and external shuttering has been used, in which the concrete was rammed from the top. The form of the internal centering and the manner in which it is strutted is shown in the view below, while in the bottom view on the opposite page will be noticed the external shuttering being brought into place. The same external centering has been made use of for the various portions of the dome between the steel ribs, that is to say, the lower portion has been constructed in sections, and the centering then moved up to construct the upper portion. In moving the shuttering round the dome it was suspended by means of wire guys.



View showing internal shuttering to dome, with struts
"MORNING POST" BUILDING, LONDON.

CONCRETE FAILURES.

By Thomas Potter.

(*Concluded from p. 28, C. & S. Supp.*)

Many terrazzo and mosaic floors are disfigured by cracks that do not sometimes occur for years after the work has been completed. The fine floor of the booking office at the new Waverley Station, Edinburgh, is much disfigured in this manner, and appears to get worse, although it has been finished now for some years. These cracks form no defined lines, and are altogether different in shape from those usually seen in concrete floors; possibly the concrete is in no way responsible for the result, but that the latter is occasioned by the large proportion of cement used in bedding and jointing the small marble squares, and changes of temperature which the floor is exposed to from numerous doors nearly always open, in addition to, possibly, unseasoned cement.

Cracks in concrete floors are usually seen in straight lines, and frequently over the supporting steel joists where the concrete is less in thickness, and at those points it is *per se* less able to resist a tensile strain. Concrete inside buildings is not so liable to climatic changes, and when expansion or serious contraction occurs it is *prima facie* evidence of bad materials, or inefficient workmanship, or both.

With roofs it is different;

in the early days of concrete it was supposed that if the concrete of flat roofs was cemented, they would remain watertight, and so they did until a sudden spell of cold weather commenced, when cracks developed, and they had to be covered with asphalt. With roofs of small area this may not occur, but there is a certain amount of risk to be run. This is unfortunate, as otherwise a steel and concrete roof should cost little, if any more, than a wood, slated, or tiled one.

There is no evidence that cracks of slight character weaken concrete floors or walls, probably owing to the fact that in most cases they do not go through the entire thickness of the concrete, and it is owing to this that it is thought by many that cracks are the result of the exposed portion drying and hardening more rapidly than the bulk. There is reason in this, as it is fairly certain that the hair cracks which occur in cement plastering of outside walls done in hot weather arise in most cases from the same cause.

Failures and collapse of concrete floors and roofs often result from

a too sanguine view

of the strength of the concrete. As the latter dries much quicker on the top surface than on the under owing to the supporting platform or centering boards preventing the atmosphere from penetrating, it takes considerable time to harden sufficiently to support with safety its own weight. The underside of the floor or roof is, when the supports are removed, subject to a tensile strain, and when its capability for resisting this is not equal to the stress caused by its weight, a collapse is inevitable. The upper portion being under a compressive strain, and stronger for the reasons just stated, is probably never a factor in the cause of failure.

A Cambridge Failure.

The fall of a portion of a concrete roof, which in its descent carried with it the floors beneath of a building being erected for an Anatomical Museum at Cambridge University in 1878, was interesting for various reasons. According to the report of Sir Arthur Blomfield, who was instructed to investigate the cause of the accident, the concrete was six inches in thickness, and constructed in the usual way on wood centering. The concrete was composed of one part of cement, six parts of washed shingle, and one part of washed sand, practically one to seven. The unsupported areas between the main joints measured 18ft. by 10½ft., 20ft. by 10½ft., 24ft. by 12ft., and 16ft. by 15ft. respectively. The roof concrete was put on between December 28th and 31st, while there was some frost, and the centering remained up until a few days previous to February 18th, when the collapse took place. It will be remarked that the unsupported areas of the floors were of unusual dimensions, the largest containing an area of 288ft. super, and as no mention is made in the elaborate report of Sir Arthur Blomfield of any transverse joists being embedded in the concrete, or any description of reinforcement, and taking into consideration that cement at that period had twenty-five per cent. less strength than at present, the collapse, to most people, would appear as a foregone conclusion, instead of which other floors that did not fall remained sound when three hundredweight per foot superficial was placed upon them as a test. One part of cement to seven parts of an aggregate would be considered at the present time too small a proportion of the former, and one part of sand to six parts of shingle, from which the smaller portions had probably been eliminated in washing, would scarcely form a homogeneous mass. Altogether this accident was an object lesson in proving what extraordinary strength concrete possesses, even when not of the best.

A case of a failure of concrete floors has lately occurred—other than a collapse—to a large public building erected by a well-known firm of architects, and under the constant supervision of an experienced clerk of works. The aggregate was composed of clinker ashes four parts, rock sand one part, and Portland cement one part. The cement was tested from time to time for tensile strength, which averaged 500 pounds per square inch after immersion in water for seven days; it was aerated by being emptied from the sacks on to a wood floor of a shed open at the sides for twenty-four hours previous to use, and rough and ready tests were made for expansion. The result was that expansion commenced about three months after the concrete was deposited in place, when it increased very gradually until cold weather set in. It then ceased and commenced again when the temperature rose, and continued for several months, ending apparently when it had expanded at the rate of one inch in every fifteen feet of linear dimensions. Foreign cement was used, and the only possible conclusion is that the cement was overlimed and unseasoned, and that unfortunately instead of a month's aeration at least it only had twenty-four hours.

Incidentally we may remark that it is said that the cement used for the Roman Catholic Cathedral in Westminster was kept on the building for three months to ensure perfect aeration.

Monolithic Concrete walls

exposed to sudden and extreme variations of temperature are apt to show signs of expansion and contraction, no matter how well seasoned the cement may be, but when the latter is unseasoned there is scarcely any limit in this direction. Brick walls built with lime mortar, as we all know, are not subject to this failing; the innumerable mortar joints are sufficiently compressible to take up the expansion and contraction caused by climatic changes without visible evidence thereof, and this is the case also with lias lime concrete walls if the lime is finely ground and aerated in a shed with open sides for a month at least. I have built walls of this character more than a hundred feet long and eighteen feet high without any signs whatever of contraction and expansion. Cement concrete walls built about March or April and during the summer months show no signs of change of form until late in the year, when a sudden fall of temperature causes cracks to appear; these close again when mild weather sets in.

I have in mind a concrete open reservoir which invariably held water during the summer months, and as invariably ceased to do so during cold weather, no matter what was done to the cracks; cutting chases out of the concrete and filling them with cement, punching red lead into the cracks, and other expedients were tried, but none were of any avail.

A garden wall about two hundred feet long developed cracks every twenty feet or so, and these acted almost as a weather chart insomuch that they increased or diminished in size as the temperature fell or rose.

Effect of Reinforcement.

When, however, some form of reinforcement is employed—iron hoop, rods, or bars, for instance—the cracks are very much less in evidence as a rule, and in external walls of buildings less still; the latter appear to be more under control through the tie exercised by the floors, roof, and cross walls, and that this control takes place is proved by the cracks in boundary or garden walls, which usually commence at the weakest point, the top, and get less lower down so that at ground level they disappear entirely.

I have always thought that when the aggregate was slag from iron ore the visible effect of expansion and contraction was less than with any other description, but I have no positive evidence to this effect.

Effect of Cold weather.

The disposition to expand and contract is diminished if concrete work of any description is executed in cold weather, and *vice versa.* The nearer the temperature to zero the better, but the work has to be protected in case of a rapid fall. When unseasoned cement is used horizontal cracks will appear in concrete walls, more especially where the work has been suspended for a time and recommenced, and this action is identical with the use of unseasoned cement mortar for brick walls, as previously mentioned.

The effects of contraction and expansion are very plainly visible in the retaining concrete walls of the London and Brighton, and London and South Western Railways for a few miles out of London, so far as vertical cracks are concerned, owing to climatic changes. When first executed horizontal cracks were in evidence as well.

Walls of buildings do not give as a rule so much evidence of change of form as walls exposed on both sides to change of temperature, because they are better protected from the latter.

Frost.

Portland cement concrete is seldom affected by frost after it has been deposited in place twenty-four hours, except frost has intervened before the initial set has taken place, in which case the latter is quite suspended, or very protracted. I have known it to have acquired scarcely any set after a week's frost, but when a thaw has taken place to have eventually become as sound as any other portion after time has been given it to attain hardness. There is no doubt but that concrete has been removed on many occasions under the impression that it was past redemption, but which only wanted time to recuperate.

A trying condition for concrete

is when a heavy rain occurs immediately after it has been deposited in place and a sharp frost follows quickly after the rain, a state of affairs which concrete is often obliged to yield to, and which time will not heal. A gentle tapping with a stick will reveal whether this is the case or not. In my experience, however, this is a very infrequent occurrence.

Another form of failure

is the capacity of concrete for conveying sound, and the better the quality of the concrete the better conductor it becomes. This applies to floors, partitions, and walls; in my own experience I have known where ordinary conversation in a room divided from another by a six inch concrete partition plastered on both sides has been distinctly heard in the latter when listening for the purpose, and sounds of walking on the floor of a room made of nine inches in thickness concrete, with floor boards and wood joists resting thereon, were quite perceptible in the room below. Possibly, however, much of the sound attributed to the floors arises from the walls acting as conductors, in proof of which the sound was much less apparent in a room where the one over was a large one than in another where it was smaller, in each case the person reading in a loud tone and standing in the middle of the room. Thick carpets to rooms deaden the sound a good deal from coming through floors, but the only efficacious remedy is to form a suspended ceiling below, and quite clear of the floor. It is somewhat curious that sound is carried much more readily through concrete previous to its attaining its final hardness—*i.e.,* months after it has been deposited in place.

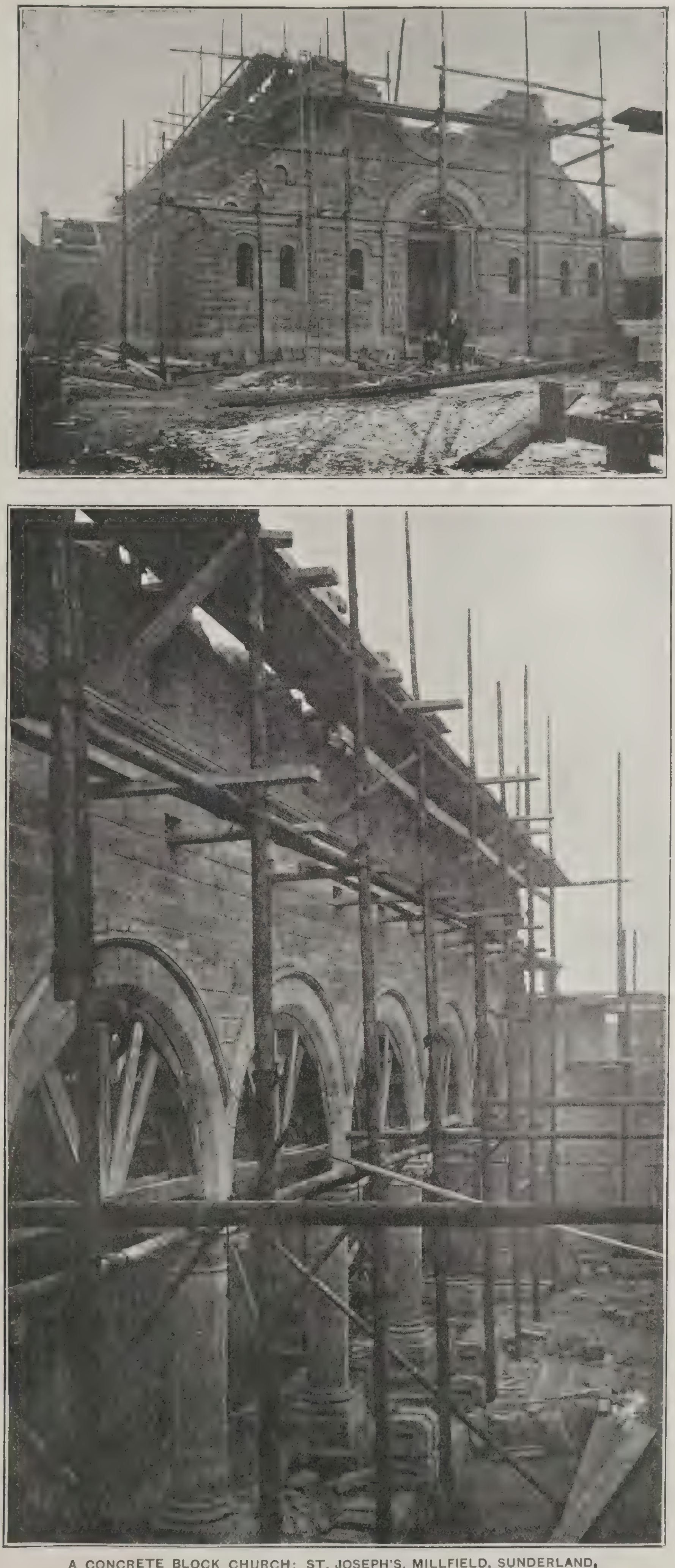
For sound passing through partitions there appears to be no simple remedy; it has been suggested that they should be built hollow, but with monolithic concrete walls this is impracticable, as also is the embedding of thick sheets of hair felt in the concrete, both of which have been tried with no real success, but the reverse.

A curious failure

in connection with concrete has occurred lately. As is well known, plaster of Paris was used forty years ago as the matrix, and a case occurred where during certain alterations it was necessary to remove the wood walking surface and raise the plaster concrete with Portland cement concrete. The effect was that the water from the latter caused the plaster to expand, and lifted the cement concrete to a serious extent. Cement concrete, made with old gypsum floors that had been removed as an aggregate, did not set at all and was unusable. It would appear, therefore, that the chemical properties of gypsum retain their vitality for an indefinite period, and, as gypsum will corrode iron and steel to an alarming extent (this having been clearly proved by specimens taken from old gypsum concrete floors), it is a question if this action is active forty years after its use and is still going on, how long the many concrete floors constructed in this way in former times will be safe from collapse.

Incompetence of Ordinary Workmen.

The use of concrete for foundations, an operation, given the right materials, capable of being executed in a rough and ready way by any description of workmen, has led to the same view being taken with regard to the use of concrete for more scientific purposes. Much that has been done, and is being done at the present time, is of a very inferior character, and it is owing possibly to a knowledge of this that so large a



A CONCRETE BLOCK CHURCH: ST. JOSEPH'S, MILLFIELD, SUNDERLAND, THOAMS AXTELL, ARCHITECT.

margin of theoretical safety is provided for in buildings where cost is not the main factor to be dealt with

CONCRETE BLOCK CHURCHES.

Two churches constructed entirely of moulded concrete blocks are in course of erection at King's Cross, Millfield, Sunderland, and Seaham Harbour, in the County of Durham. The exterior facings are of rock-faced blocks with drafted margins, and the jambs, arches, and mouldings represent banker-worked stone with rubbed or dragged faces. The interiors are faced with blocks having smooth rubbed faces, and are finely jointed and pointed so that no plastering is required, and the appearance is that of fine stone ashlar work.

The colour of the blocks is a brownish-blue, somewhat similar to that of Heworth Burn stone, but almost any shade or tint can be obtained by using suitable material for the ingredients of the concrete.

The blocks are made with crushed whinstone, sharp sand, and Portland cement, in the proportion of five, three, and two, this being found to make a first-class block, clean, hard, and of even colour. The ordinary building blocks are 2ft. 8ins. long, 10ins. on bed, and 9ins. high, and are made in the Pioneer Concrete Machinery Company's machines. The blocks for labels, columns, strings, and dressings are cast in specially constructed moulds.

The whole of the block making is done by intelligent labourers under the supervision of a competent foreman. As soon as the men have finished punning or ramming the concrete, the moulds or machines are opened out, and the finished blocks are carried away to the curing ground, where they are placed a few inches apart on racks and kept damp until thoroughly set, and when they are weathered, which is in from two to three weeks' time, they are ready for the fixers.

The carved caps of columns are each cast solid in one block, and when set are hoisted up and fixed in a finished state.

The cost of the work is stated to be about half that of stone, and the appearance is such that only practical men can tell the difference between it and stone.

The churches both stand high, in positions exposed to the North and East, the one at Seaham Harbour being open to the sea on the east side, and, though the walls have been uncovered during the severe frost and snows of the past winter, there is not a block affected in the slightest.

We illustrate St. Joseph's Church, Millfield, in course of construction. This will have an overall measurement of 115ft. by 50ft. Large sacristies will be added. Seating accommodation will be provided for six hundred. The church is estimated to cost only about £3,100. St. Mary Magdalene's Church, Seaham Harbour, which is 13ft. less in length, and with accommodation for four hundred and fifty, will cost about £2,700.

The introduction of concrete-block work for these churches is due to Mr. Thomas Axtell, an engineer of Ryhope, Sunderland, who has designed the buildings.

Mr. J. O. Dunn, builder, John Street, is responsible for the carrying out of the main part of the contract.

REINFORCED CONCRETE SYSTEMS.

XII.—The Kahn Trussed Bar.

The Kahn Trussed Bar was invented by Mr. Julius Kahn in 1903. Since that date the development of its use has been quite phenomenal. The Kahn system is now one of the most important systems, not only in the United States but in England, although in this country it was only introduced a little over a year ago. The Kahn system is also making progress on the Continent, and its use is extended to the Colonies and to South America.

The Trussed Concrete Steel Co., the concern which works the Kahn system, was originally organised as a private company in 1903. After three months' existence it was formed into a corporation of 200,000 dollars capital. After two years further working the stock was increased to one million dollars, of which all the capital is fully paid up. In one way, this shows the wonderful progress the system made in the United States, but the following figures are still more striking. In 1904, after the first year's work, 3,000 tons of Kahn trussed bars had been sold, in the second year's working 18,000 tons were sold, while in the third year—namely, 1906—36,000 tons of steel bars were sold. Last year 15,000 constructions were erected in America alone.

Progress in England.

The London office of the Trussed Concrete Steel Co. was opened in February last year, and in the first year's working 120 orders were obtained. It is true, many of these orders were small ones, but we mention the figures because they serve to show the great interest which is taken in the subject of reinforced concrete in England, and particularly the attention attracted by the good qualities of the Kahn system. While the majority of these orders were small, several of them were large ones, although of course the scale of building operations in this country is very small compared with those of America, where large buildings are so much in evidence.

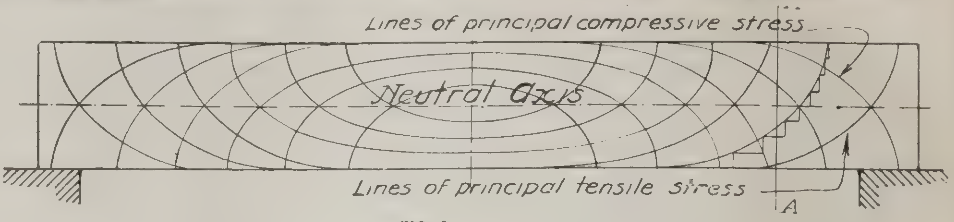

Lines of principal compressive stress
Neutral Axis
Lines of principal tensile stress
A

FIG. I.

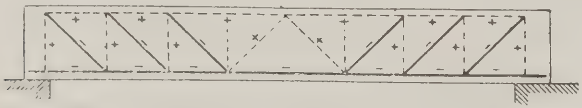


FIG. 3.—DIAGRAM SHOWING TRUSS ACTION.

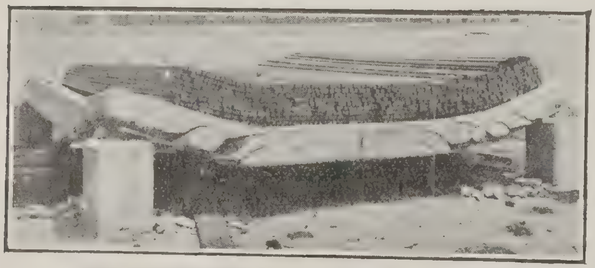


FIG. 2.—TEST SHOWING FAILURE BY SHEAR.

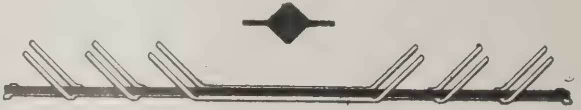


FIG. 4.—CROSS SECTION AND VIEW OF ORDINARY KAHN TRUSSED BAR.

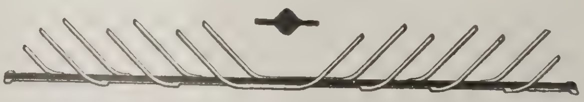


FIG. 5.—VIEW OF KAHN TRUSSED BAR WITH ALTERNATING DIAGONALS.

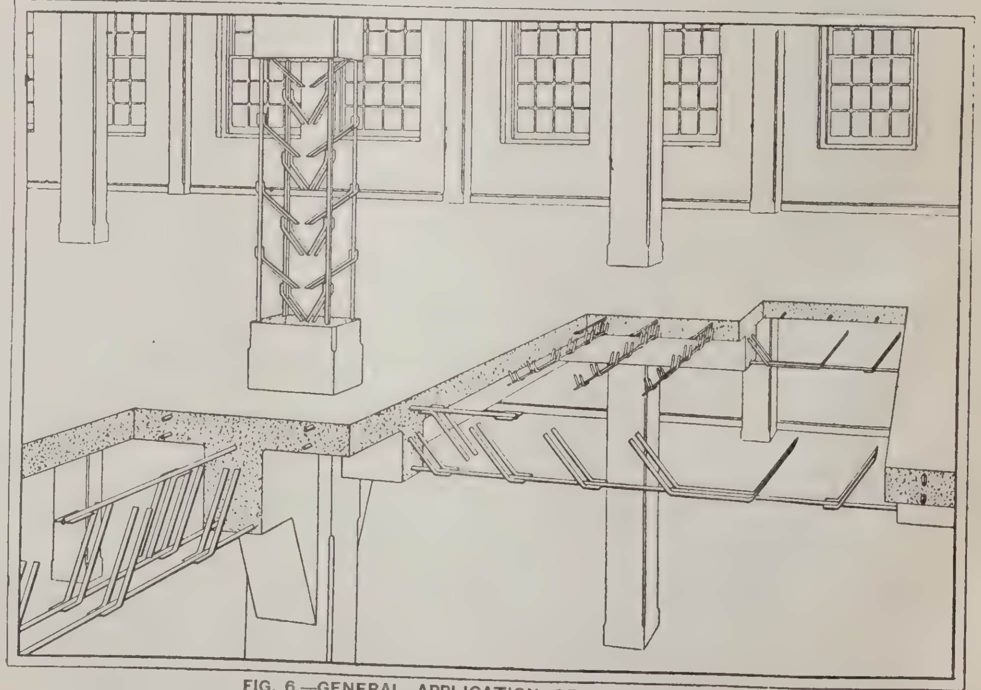


FIG. 6.—GENERAL. APPLICATION OF KAHN SYSTEM

Beam Action.

The Kahn bar is essentially different to other bars used in reinforced concrete work, in that it has prongs turned up to resist shear stresses, these transverse reinforcements being rigidly connected to the bar. The Kahn bar was designed specially for beam construction, although its use has been extended to other purposes, and, therefore, in elucidating various points about the Kahn system we must refer, firstly, to the principles entailed in beam action in reinforced concrete. Beam construction is the most important part of reinforced concrete work, not because it is any more important to the strength of a structure, but because the greatest amount of reinforced concrete work is done in floors and roofs. A floor slab is really a beam, although we apply the use of the word more particularly to the ribs supporting the floor slab. The Kahn bar is used both in floor slabs and in the actual "beams."

When external forces are applied to a beam construction, as we all know, the top undergoes compression, and the bottom is subjected to tension, a neutral plane existing between the two. Owing to the elasticity of the materials of which a beam is built, bending takes place. In addition, however, to the forces which cause bending, the upward thrust from the supports and the downward thrust of the load tend to cause the beam to slide down bodily, by slipping along the vertical planes. The horizontal forces of tension and compression become combined with those of vertical shear to produce oblique stresses. Now both the tension and the compression in the beam vary in proportion as their distance away from the neutral surface. The vertical shear stress, however, is practically constant throughout the depth and the resultant strain on any particle is a combination of these two components, and it produces lines of principal tensile and compressive stresses of variable curvature from the bottom of the beam to the top (see Fig. 1). This was demonstrated many years ago by Mr. G. B. Airey, Astronomer Royal, and received more elementary demonstration by Rankine.

Failure by Shear.

Knowing that concrete is weak in tension, we might expect that cracks would develop along the lines of principal tensile stress and we find from the results of experiment that this is exactly what does occur. Fig. 2 shows a test that was carried out by the United States Government War College. That such lines of fracture were not observed in many tests that had been carried out is easily accounted for from the fact that in the majority of cases the loading has been concentrated, being applied in a compression testing machine with a single ram. The phenomenon only becomes apparent when the loading is uniformly distributed. Ordinary tests performed with concentrated loads are thus deceptive. It is very seldom in actual practice that a beam has to carry a concentrated load. In almost every case the load is a distributed one.

Explanation of Shear Failure.

The way in which these shearing cracks are developed in a beam has been variously explained, but a very probable explanation is that the concrete on the underside of the beam first fails by being stretched beyond its elastic limit, and small cracks or planes of separation become developed. Until these cracks appear the shear strains are not excessive, but as soon as the concrete becomes separated the shear stresses (though below what the concrete ought to stand) extend these cracks along the lines of compressive stress, owing to the lines of principal tensile stress crossing these lines of principal compression stress at right angles.

Various Shear Reinforcements.

Of couse Mr. Julius Kahn was not the first to become aware of this phenomenon. U-shaped hangers of hoop iron were early introduced placed vertically around the main tension bars for the purpose of resisting these shear strains. Such hangers, of course, are effective up to a point.

Another method in addition to the U-shaped hangers that has been adopted by engineers in reinforced concrete design is to bend the tension bars up through the depth of the beam as they approach the supports.

In both methods of reinforcing against shear there is undoubtedly something wanting. In the first case—namely, where hangers are adopted—when the concrete has cracked and the shear stresses become excessive, the hangers slide along the bar. If we wish to understand why this is so, we see from Fig. 3 the service which shear members perform. The inclined shear members serve as diagonals of a truss of which the top compression chord is formed by the concrete and the lower tension chord by the longitudinal reinforcement. Obviously if these inclined members are to transmit stress, they must be rigidly attached to the bottom chord. If we doubt this, a test can be carried out with an N-truss, in which the diagonals are not rigidly connected to the bottom chord. The other method of reinforcing against shear—namely, by turning-up the tension rods as they approach the supports—is open to the objection that in a long beam 20 or 30 shear members are often used, and the inadvisability of using 20 or 30 small rods in each beam is evident. Such a system would be expensive and awkward in practice. The smaller the number of bars and the less possibility there is of error in the workmanship the better.

The Kahn bar, it is obvious, has a distinct trussing action, which is somewhat in the nature of that shown in Fig. 3.

A section of the Kahn bar with the diagonals together is shown in Fig. 4; for deeper beams, the diagonals are sheared so as to alternate, as shown in Fig. 5. It will be noted that the reinforcement is inclined to the vertical at the angle of 45 deg., which conforms closely to the lines of principal tensile stress developed in the beam. Furthermore, it will be noted that in the centre of the bar where the shear stresses are smallest and the concrete is quite capable of resisting them that the inclined shear members are not turned up, the full section of the bar being retained so as to increase the section of the metal at this point, where the bending moment is greatest, and the largest proportion of reinforcement is required. Towards the end, the section of metal may be reduced as the bending moment decreases, and this is done with the Kahn bar, as shown, by turning the metal into the vertical shear members or prongs. It is to be noted that the connections of these prongs to the bar form shoulders, thus giving a mechanical bond and doing away with any necessity of placing reliance upon the adhesion of the concrete to the main tension bars. It is a commonplace of reinforced concrete theory and practice that the adhesion of concrete to steel is a very variable quality, and may be entirely destroyed by various circumstances. In the Kahn system the mechanical bond can be relied upon.

Standard Sections.

The standard sections of Kahn trussed bars are as follows :—

Size in inches.	Wt. per lineal ft. in lbs.	Area of section in sq. ins.	Total width across wings in inches.	Length of side of same bar between wings	Thickness of wings in inches.	Length of diagonals in inches.
$\frac{1}{2}$	1·4	·38	$1\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$	6
$\frac{3}{4}$	2·7	·78	$2\frac{3}{16}$	$\frac{3}{4}$	$\frac{3}{16}$	12
1	4·8	1·42	3	1	$\frac{1}{4}$	18
$1\frac{1}{4}$	6·9	2	$3\frac{3}{4}$	$1\frac{1}{4}$	$\frac{1}{4}$	24

The height to which the wings are turned up can, of course, be varied if necessary, though it is seldom found advisable.

General Application.

Fig. 6 illustrates the general application of the Kahn system to building construction. The way in which small sections of Kahn bars are used in the floor slabs combined with large Kahn bars in the main beams is clearly shown. The main beams are calculated as tees, and where a beam is carried over a support it is rendered continuous by placing short lengths of Kahn bars reversed, as is to be seen in this view. These serve to resist the reverse bending moment, the top of the beam over the support being in tension, and the bottom in compression, whereas the opposite is the case at the centre of the span. As regards the column reinforcement, we will return to this later.

Rods running at right angles to the line of Kahn bars are used to transmit concentrated loads, and prevent longitudinal cracks, serving the same purpose as the crossing bars which Monier and other early constructors found to be necessary. In each span, three of these round rods are used at equal distances apart; one in the centre and the others at a quarter of the span.

Hollow Tile System.

Another application of the Kahn system is the "hollow tile" construction (as it is called in the United States). Kahn bars are placed between hollow terra cotta blocks upon which a top layer of concrete is placed to resist compression. The weight of the concrete is reduced by the adoption of these hollow terra cotta blocks and little, if any, strength is lost thereby, because the concrete below the neutral axis cannot be depended upon to add anything to the strength of the floor. The "hollow tile" system indeed is a kind of T-beam or rib construction. The first application of such beam-construction was in roofs, it being found that with the extremes of temperature which exist in the United States trouble was caused by condensation of moisture on a solid concrete roof. A roof constructed on the tile system, however, was heat-and-cold-proof to a great extent, and moisture did not collect in the same way on the underside.

It should be observed how advantageous such a system is for roof-construction, because there is no necessity for using a double centering to retain the concrete, the tiles serving to break up the concrete and doing away with its tendency to slide. The concrete is merely filled in between the hollow terra-cotta blocks, and finally, if necessary, carried over the top.

It was found that when such a system was extended from roofs to the construction of floors that these latter were far more sound-proof than a solid concrete floor, and at the present time the Kahn system of a combination hollow tile and reinforced concrete floor is greatly favoured in the United States, an enormous quantity of work now being done.

Speed.

Such a system, too, is very speedy in construction, though the Kahn system has made a great name for itself in connection with the rapidity with which plain reinforced concrete buildings have been put up. Quite extraordinary examples of speed have been shown, even for America, which is noted for such efforts. Of course, there can be too much haste, and in England we should hardly desire things to be done with such speed as in the States, but it is well to bear in mind that the Kahn system has shown that reinforced concrete work is not necessarily slow in construction. From the time of design to actual completion, it is very much quicker than steel-frame construction, because there is no waiting for steel to be manufactured.

Deep Beams.

Where the depth of a beam is so great that the diagonal reinforcement of the Kahn bars will not extend high enough up, the method adopted is to bend up one or more bars from the centre of the beam so as to enable the shear reinforcements of the upper beam to extend to the top. The inclined tension bar, too, also reinforces against shear as well as the diagonal wings.

Columns.

For the reinforcement of columns the Kahn bar is placed at the angle, the wings being extended inwards on the diagonals of the square plan of the column, as shown in Fig. 6. These wings serve the same purpose as links—*i.e.*, they tie the bars in and prevent them bursting out laterally under pressure. It is to be noticed that the ties in the Kahn columns will not get out of place if the concrete is rammed in position from the top, as loose links would do, although it is inadvisable to ram concrete in columns in too deep layers. The usual practice of careful tamping the concrete between the ties, bringing the column up gradually, is followed with Kahn bar reinforcements. That is to say, the fourth side of the centering is not completed before the concrete is put into position, but is carried up bit by bit by means of short boards, as the concrete is put in.

Several Domes

have been reinforced with Kahn bars. It may be noted that the largest dome constructed on this system is that for the Pearce Motor Car Co. in America, and is 120ft. in diameter. A very interesting application embodying a new feature in dome design was carried out at the Brooklyn Mortuary Chapel; the dome in this case was 60ft. in diameter supported on an octagonal base and with a centre eye. The inter-penetrating barrel vaults of the nave and transept with arches thrown between the piers formed eight pendentives. It was thus impossible to place reinforcement in the form of a ring round the base of the dome. A great thickness of concrete would have been necessary. However, by throwing over four main arches in the line of the nave and of the transept, the shell of the dome merely consisted of a panel of small thickness; a very economical construction was thereby obtained.

Bridges.

The Kahn system has been used in quite a number of concrete bridges of arched form, and we illustrate below an interesting bridge at Wabash, Indiana.

This bridge is 240 feet long over all. It comprises two arches of 75ft. span in the clear, and 18ft. rise. The width of the roadway is 32ft. over all. The arch ring is designed in accordance with the method of calculation devised by the late Professor Charles E. Greene, of the University of Michigan. The thickness at the crown is 18 in., and at the haunches 3ft. 4in. The spandrel walls were designed as vertical cantilever slabs. Special effort was made to make both arches continuous as far as possible.

Retaining walls, dams and reservoirs

have been carried out on the Kahn system. In our issue for July 18th we published a design for a coal pocket at Northfleet, in which the principle was adopted of giving additional stability by weighting a projecting foot with a part of the super-incumbent load to be retained. Buttresses extend at intervals from this foot up to the top of this retaining wall, and the wall between is treated as a beam.

Pipes and Sewers.

The Kahn bar has also been used for reinforcing pipes and sewers. In our issue for September 12th we gave an illustration of a typical Kahn reinforcement for sewers.

Numerous load tests

have been carried out on beams reinforced with Kahn bars, with which we have no space here to deal. Some very remarkable results have been obtained showing the necessity of rigid attachment of the shear members in order to secure high efficiency of the reinforcement.

An Official fire test

has also been carried out on a reinforced concrete floor constructed on the Kahn system at the fire-testing station at Columbia University, New York. This test was conducted by Prof. Ira H. Woolson, in co-operation with the New York City Building Bureaus. The floor was 15ft. span and was carried on two reinforced concrete girders 18ins. deep, including the floor, of which they formed a part. The total length of the floor was 19ft. 8ins. The fire was continued for four hours, gradually rising to 1,800 deg. F. Water was then applied.

The thickness of the floor slab was 6ins., the protection of the rods being 1in. in this part and $1\frac{1}{2}$ins. in the case of beams, measured from the lowest point of the bars. The concrete for the floor was mixed in proportion of 1 cement, $2\frac{1}{2}$ sand, and 5 broken stone, and 1 : 2 : 4 : for the girders. The stone was trap rock crushed to $\frac{3}{4}$in. size. The ceiling was not plastered. The floor was loaded with 150lbs. per sq. ft. during the test. A deflection of $4\frac{1}{8}$ins. on the middle of the floor occurred during the fire. This included a deflection of $1\frac{3}{8}$ins. in the middle of the girders. When the load was removed, and the floor allowed to cool, the deflection was reduced to $1\frac{5}{8}$ins. for the floor, and $\frac{5}{16}$ ins. and $\frac{6}{16}$ins. respectively for the girders. The final load to 600lbs. per sq. ft. after the test produced a total deflection in the middle of the girders of $\frac{15}{16}$ in. and $1\frac{1}{8}$in. respectively, and the deflection of the floor slab relative to the girders was $\frac{3}{32}$ in. As regards the condition of the concrete, it was somewhat pitted where subjected to the force of the water, but no flaking had occurred.

We may call attention here to an obvious advantage of the Kahn bar in connection with resistance to effects of fire of floors constructed therewith. It is always found that the application of water on the heated concrete removes the concrete surrounding the bars. Obviously the adhesion is always totally destroyed. With the Kahn bar, however, the diagonal reinforcements extend into the concrete and produce a stress in the steel bar which forms practically a tension chord of a truss, and the loss of adhesion does not affect the strength of a floor. All that would be necessary after a fire had occurred would be to plaster the underside of a Kahn floor.

Steel used for Bars.

Kahn bars are usually made of medium open hearth steel. When such is the case, the manufacturers assume full responsibility, but if high elastic limit steel is required, the purchaser has to take responsibility for the quality of steel. The manufacturers think that high elastic limit steel is unreliable.

Calculations.

As regards the theory of calculations advocated by the Trussed Concrete Steel Co. the usual modern methods are used. A useful little pamphlet is issued giving an admirable summary of the methods of calculation adopted generally and the small influence of varying relations between the moduli of elasticity of the concrete and the steel. From the complete theory handy, yet accurate, constants have been derived for practical designing.

Contracts Carried Out.

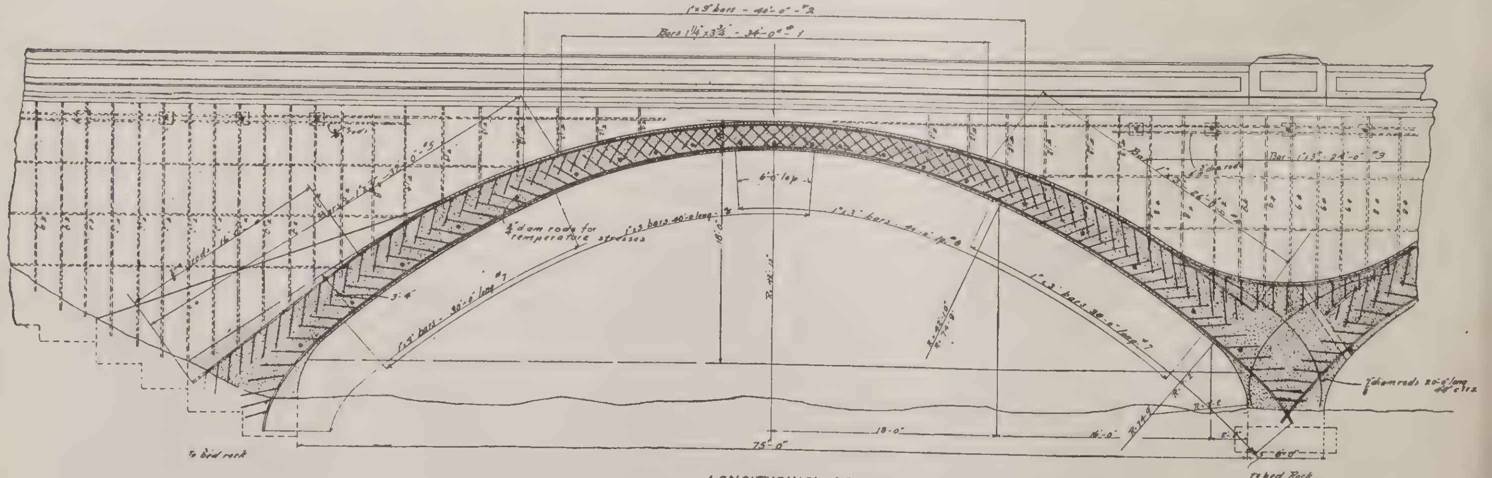
As regards the constructions which have been carried out we have not space to give even the names of the larger ones in all the various branches of building and engineering to which the Kahn system has been applied. We can only confine ourselves to a few striking instances in building construction where the Kahn system has been adopted by the United States Government and which are as follows :—

Naval Hospital, and Academy Buildings at Annapolis; War College, Soldiers' and Sailors' Home, Naval Hospital, and two Agricultural Buildings at Washington; and the Army School at West Point.

At this last-mentioned the Kahn system was used in buildings costing about one million pounds.

As regards England, the system has not long been introduced, but the following are a few of the most important buildings in which the Kahn bar has been used :—

Factory, Carlisle, for Hudson, Scott & Sons, Ltd.; coal hopper, Bevan's Cement Works, Northfleet; extensions to Town Quay, Southampton; administrative block, Peter Brotherhood's Works, Walton; bridges at Lucker and Lilburn, Northumberland; coal hopper and floors, Cement Works, Swancombe, Kent; floors, City Chambers, East Parade, Leeds; Nos. 1-4, Lombard Street, London; public baths, Lime Grove, Shepherd's Bush, for the Hammersmith Borough Council; Horsforth Hospital, Leeds; Co-operative Stores, Tamworth; repository, Rye, Sussex; Leeds Forge, Leeds; factory, Histon, Cambs, for Chivers & Sons.



LONGITUDINAL SECTION.

CHARLEY CREEK BRIDGE WABASH, INDIANA.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
April 24, 1907.
CONCRETE AND STEEL SUPPLEMENT (MONTHLY).

SPIRALLY REINFORCED CONCRETE AND ITS APPLICATION.

By **A. Considere**, Inspecteur-General des Ponts et Chausées (retired).

(Continued from p. 33.)

Chapter II.—Various Experiments : Results regarding Resistance.

Among the numerous experiments in regard to compression on reinforced prisms, the results of which have been published, there are several tests which cannot be compared because there were no plain concrete test-prisms of the same dimensions. To show that it is impossible to deduct precise conclusions from these, the following facts may be cited :—

To compare with posts Nos. 7 to 10 of the table given before, plain concrete test-pieces were made, with concretes of the same proportions, containing the same quantity of water, and having the same section as the posts, being in one case 2 metres and in the other 4 metres long. The resistances of the posts having the cement in the proportion of 350 kilogrammes were respectively 242 and 198 kilogrammes for the posts of 2 and 4 metres. These resistances differed still more with a mixture made with 500 kilogrammes of cement.

It has even been observed that proportions of 48 centimetres in length cut one from the base, and the other from the top of a post 4 metres long, showed a difference of resistance of 96 kilogrammes. The cause of these disconcerting results would seem to be as follows :—When the concreting of the post is commenced the concrete has the consistency given to it by the mixing, and supports the ramming well. It acquires a considerable compactness and a high resistance. But, during the work of concreting, and while the setting is taking place, the rammed concrete allows a part of the water it contains to rise on to its upper surface. Consequently, when a fresh quantity of concrete is added, the concrete which is rammed becomes more and more moist and less and less capable of acquiring the maximum compactness and resistance. The longer the post the worse becomes the quality of the concrete at the top, if a drier and drier mixture is not used.

To explain the motive which has led us to exclude from the previous table the experiments of which the conditions of execution were not perfectly known, it was important to bring to light this fact (perhaps not again mentioned), that the height of the concrete posts made without special precautions exercised on their resistance an important influence, and independent of the effects of lateral flexure.

It may be added that on the whole the results of the published experiments tend to confirm the statements made in Chapter I., and to show that the increase of resistance given to concrete by the reinforcements of types in vogue is irregular and much less than expected. Against these facts can be opposed the happy results given by practice, but to this we must add the following observations :—

On the one hand, the posts are generally calculated with a factor of safety of at least 4, even 5, and sometimes, as in Germany, of 10. Consequently, the success of the constructions cannot give an indication of the real resistance of the posts.

On the other hand, some very experienced designers calculate their posts so as not to put on the concrete a greater pressure than 25 kilogrammes per square centimetre, whereas its real resistance varies in general from 150 to 200 kilogrammes. Therefore, there is in this respect an excessive prudence which, even in the case of weak percentages of metal, compensates for the temerity of the other.

In brief, the results of laboratory experiments lead one to think that in the posts constructed and calculated erroneously, the factor of safety is excessive when they are feebly reinforced, and too small when they contain a considerable proportion of metal, especially if the diameter of the longitudinal bars is too big compared with the section of the concrete.

With these observations, we give the results of some experiments.

Experiments of Professor Guidi.

A pamphlet* published recently contains the following results (in the absence of plain concrete posts having the same length and the same section as the reinforced pieces, it has been impossible to record them in the first chapter) :—

No.	Number of experiments.	Section of the concrete.	Longitudinal Reinforcements.	Spacing of the links.	Percentage of the total metal.	Resistance per sq. centimetre. Kilos.
1	3	Circular: 252 mm.	6 bars, 10 mm.	100 mm.	0·98	133
2	3	do.	do.	200 mm.	0·97	148
3	3	do.	6 wires, 5 mm.	Spirals of 5 mm. of 50 mm pitch.	0·74	178
4	3	Square: 320 mm.	8 bars, 13 mm.	150 mm.	1·12	161
5	3	do.	do.	250 mm.	1·11	153
6	3	do.	do. 18 mm.	do.	2·04	187
7	3	do.	do. 22 mm.	do	3·00	187
8	3	400 mm.	12 bars, 15 mm.	do.	1·40	139

Among these one can compare the posts 1-2-3 of circular section, 250 millimetres diameter on the one hand, and, on the other, posts 4-5-6-7 of square section of 320 × 320 millimetres. These comparisons show once more the irregularity of the effects of longitudinal bars. These are good in No. 6, but bad in No. 7. The result is, perhaps, due to the fact that the diameter of the reinforcement was smaller in the first posts than in the others.

Generally speaking the reinforcements were numerous and of small diameter. This is a condition favourable to resistance. The closeness of the transverse links appears to be useful or not, according as one compares pieces 4 and 5, or pieces 1 and 2. The posts No. 3 were the only ones spirally reinforced. Their resistance was much greater than that of pieces 1 and 2, which had a larger percentage of metal. But their superiority was due perhaps in part to the superiority of the metal forming their reinforcements.

Tests on Spirally Reinforced Cylinders without any Longitudinal Reinforcement.

The results of these tests were published in "Le Génie Civil" in 1902. It is interesting to reproduce them because they give a topical reply to the assertion that "béton fretté" is merely an improvement on ordinary reinforced concrete with longitudinal bars and tie-pieces.

No.	Percentage of the		Resistance to crushing per square centimetre of total section.	
	Longitudinal bars.	Spirals.	Spirally reinforced cylinders.	Plain test cylinders.
1	0	2	342 kilos	40 kilos
2	0	3·5	460	50
3	0	4·0	518	60
4	0	2·0	347	60
5	0	3·4	740	170

It was from these experiments that the value was deduced in 1902 of the co-efficient of the efficiency of spiral reinforcements, that has been confirmed by all the succeeding experiences (which will be mentioned later). Its determination offered very much greater guarantees of accuracy, because in the tests of this series it was only necessary to consider two elements of resistance, namely, the mortar—generally of little resistance by reason of its age (8 to 23 days, except for No. 5)—and the spirals formed of iron wire, clean and resistant.

If in these cylinders the spirals have given results so remarkable without the assistance of longitudinal bars, it is because they were very close together. The mortar could not escape between them and it was not absolutely necessary to complete by other bars the enveloping network.

Tests on Cylinders of Great Resistance.

In spite of the difficulties which might delay the use in constructions of very heavily spirally reinforced concrete (dangers of lateral flexure and of sudden bursting of the concrete enveloping the spirals), it was interesting to make tests, which would have the advantage of showing clearly the errors made in the determination of the co-efficient of the efficiency of the spirals, if any.

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*Risultati sperimentali su Conglomerati di Cemento simplici e armati.

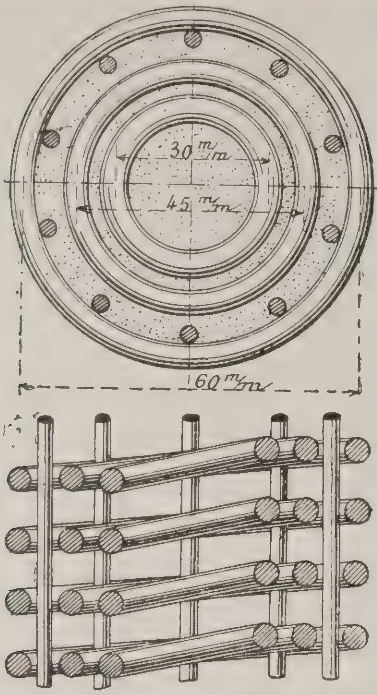


FIG. 2. SECTIONS OF A PIECE SPIRALLY REINFORCED WITH THREE SPIRALS FOR GREAT RESISTANCE.

With that object tests have been made on prisms very heavily reinforced, of which several were destroyed. The cylinder No. 2, which contained three concentric spirals failed without crushing. The resistance has been given, although it never attained its maximum.

No.	Percentage of		Resistance to crushing per square centimetre.	
	Longitudinal bars.	Spirals of iron wire.	Of the total section.	Of the section of the core.
1	1·2	6·6	800 kilos	1213 kilos
2	1·2	12·9	1243 kilos	1803 kilos

The cylinder No. 1, which did not fail, sustained without crushing a reduction in length of 12 per cent., equal to half what soft steel in prismatic bars of uniform section would sustain, and very superior to that which would cause rupture of a soft steel bar pierced with rivet holes.

The mortar of these cylinders contained 1,100 kilogrammes of cement per cubic metre of sand.

If we consider that the material, which combines such great ductility with such resistance to crushing, can offer also a great resistance to tension by the addition of longitudinal bars, it will be evident that it possesses in a high degree those qualities which are necessary in constructions.

Tests on a Prism of Large Section.

The experts charged with the examination of the scheme for a bridge in "béton fretté" of large dimensions proposed for the town of Lausanne, Switzerland, objected that the members figured having a diameter of 0·70 metre, and having to support a pressure of 100 kilogrammes per square centimetre of the section of their core (inside the spirals), one could not apply with safety to the calculation of their resistance the rules of which the correctness had been shown only for prisms of 0·32 metre maximum diameter.

To throw light on this point, and at the same time on the effects of welding spirals formed of bars of large diameter, an octagonal prism was made of 0·70 metre diameter and 1·4 metre height, using, in accordance with the specification of the proposed bridge at Lausanne, the percentage of 450 kilogrammes of cement and the percentages of 2·73 for the spirals and 1·41 for the longitudinal bars. The spiral reinforcement was given by means of spirals of 21 millimetres diameter interrupted half-way up the prism. Their ends were turned inwards so as to anchor into the middle of the section. Professor Guidi conducted the test on this piece by means of the powerful hydraulic press of the Artillery Arsenal of Turin, and recorded the results obtained in the table below :—

Pressure.		
Total Tonnes	Per unit: Kg. per square centimetre.	
780	203	Very small cracks.
1408	366	Crushing and scaling o ' the concrete envelope.
1620	421	Gradual crushing of the concrete core.

The prism in question had been made fifty-two days up to the time of the test. There having been no test made on a plain concrete prism, this experiment, which seemed to be sufficient to give all the security from the point of view of this special object, cannot therefore be used as a basis for an indisputable calculation as regards the co-efficient of efficiency of the reinforcements.

The following is, however, a correct conclusion which could be deducted from this experiment :—In dividing the applied load of 1,620,000 kilogrammes, which was supported not by the total section, but by the section of the core enclosed within the spirals, as it is said in Chapter III., we find the resistance per square centimetre to be 536 kilogrammes. Used as intended in the proposed bridge of Lausanne, this post at the age of fifty-two days gave a factor of safety of 5·36.

If we calculate the resistance that the reinforcements of this post should possess, according to the rules stated in Chapter III., we obtain 243 kilogrammes, and if we deduct this from the observed resistance of 536 kilogrammes, we find a difference of 293 kilogrammes, which, according to the same rules, supposes a real resistance of the plain concrete of $\frac{293}{1{\cdot}5} = 195$kg. Therefore, the experience of Turin proves—for a post of 0·70 metre diameter—the rules enunciated in Chapter III., provided the real resistance of the concrete of this post was 195 kilogrammes at the age of fifty-two days, which would suppose the resistance after used as a basis for an indisputable calcuone year to be 365 kilogrammes, the average results obtained on a large number of concretes at the laboratory of the Ecole des Ponts et Chaussées.

These resistances can be assumed to be correct for concrete rammed under ordinary conditions.

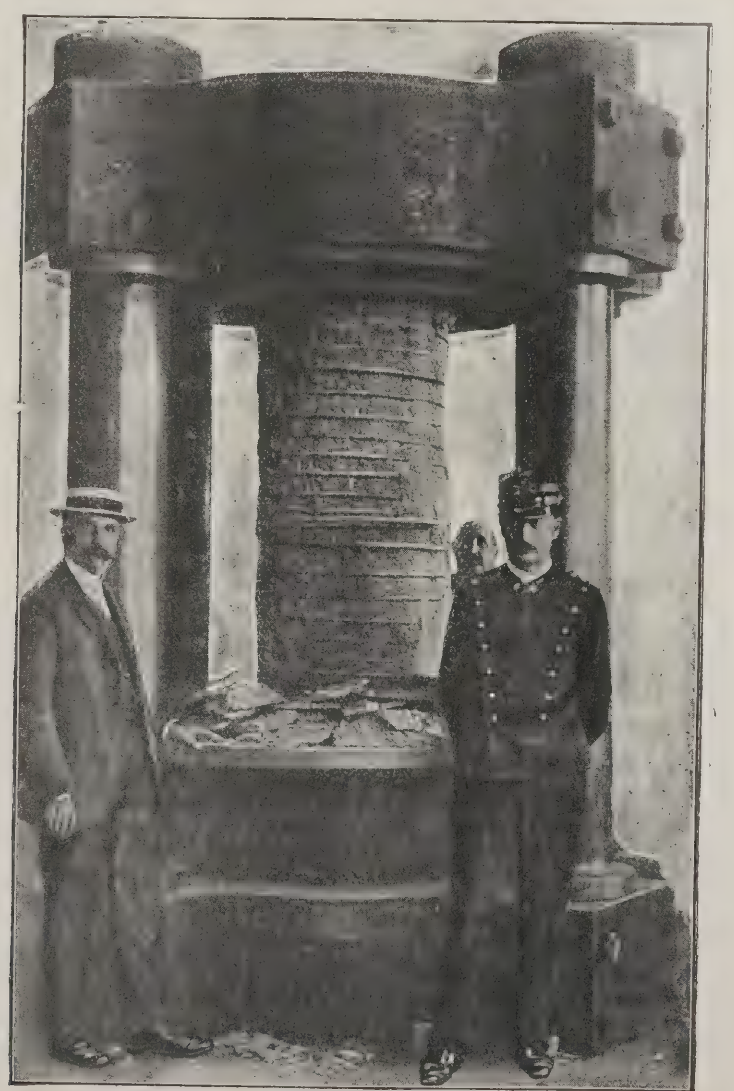


FIG. 3. TEST ON A PRISM OF LARGE SECTION AT TURIN.

Test on Concrete used in a Fluid State.

On December 28th, 1904, a post with spiral reinforcement was made under the following conditions :—The reinforcements, consisting of 7 longitudinal bars of 16 millimetres and spirals of 12 millimetres diameter rolled round a cylinder of 200 millimetres internal diameter with a pitch of 26 millimetres, were placed in a mould of square section, 0·26 metres in diameter. The concrete, proportioned 450 kilogrammes of cement to 1,200 kilogrammes of sand and gravel, had been gauged with such an excess of water that it formed a liquid mud. This mixture was emptied into the mould, where it took its level without being rammed in any way. The percentage of metal was 2·1 for the bars, and 4·3 for the spirals.

The post was tested on March 31st, 1905, and the maximum load sustained was 719 kilogrammes per square centimetre of the section within the spiral, and 357 kilogrammes per square centimetre for the total section, which was relatively excessive. It underwent a reduction in length of 2 per cent. The deformation was then stopped, without causing rupture. In the making of this post the least possible care had been taken, yet it is interesting to notice that it supported a very high pressure.

Test with Eccentric Loading.

After the test to destruction of the bridge at Ivry, a piece of octagonal section 0·25 metre diameter was cut out from one of the members, which did not show a trace of deterioration, and this was submitted to an eccentric load applied to one-third of the height of its section. The object of the experiment being to determine the effect of the expected deformation, the rotation of the basis of the post was stopped by means of wedges after it had attained the relative inclination of 0·0113. The length of the prism being 1·32 metre, this deformation corresponds to an angle of curvature of $\frac{\cdot 0113}{1\cdot 32}$, or of 8·6 millimetres per lineal metre.

In spite of this enormous bending, the post supported an average pressure of 377 kilogrammes per square centimetre before the first cracks of the surface appeared on the side subjected to the greatest compression, and an average pressure of 452 kilogrammes per square centimetre before rupture. If we compare the breaking load to the section within the spirals, which had alone sustained it, we find an average pressure of 746 kilogrammes per square centimetre as the breaking load. The portions of the same member which had been submitted to loads perfectly concentric did not carry any more.

The concrete of this member was composed of 800 kilogrammes of cement to 400 litres of sand, and 800 kilogrammes of very small gravel, called in Paris " mignonette." This mixture is equivalent to a proportion of 700 kilogrammes of cement with ordinary sand and gravel.

The high resistance of this piece under the curvature of 8·6 millimetres should be noted.

Tests on Interlacing Spirals.

In view of the construction in " béton fretté " of arches having, as those of masonry bridges, rectangular sections, some pieces of the section shown in Fig. 4 have been made and tested.

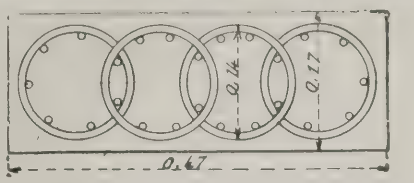


FIG 4.—SECTION OF AN ARCHED ROOF IN CONCRETE REINFORCED WITH INTERLACING SPIRALS.

The spirals were engaged laterally one with the other (this presenting no difficulty) and the longitudinal bars were put in place afterwards. The percentage of metal was 3·3. The proportion was 600 kilogrammes of cement for 1,200 litres of sand and of " mignonette." These pieces had been moulded horizontally and rammed transversely, as would the arches of bridges. By reason of the close spacing of the spirals necessitated by the very small size of the piece, the ramming was difficult. However, it was done as well as it could be for one of the pieces of which the concrete had been made of the normal consistency. For the second piece a very liquid concrete was used in the spirals, which there was no reason to ram, and the excess of water was taken up by very dry concrete, which was easily rammed all round the spirals.

The resistances were 494 and 439 kilogrammes per square centimetre of the total section, and 768 and 684 kilogrammes per square centimetre of the section contained by the spirals. The highest of these figures were given by the second piece, the making of which presented no difficulty.

Tests on Spirally Reinforced Beams.

(A) *Independent Beams.*—Two beams 4 metres in length, of which the section was a rectangle of 40 by 28 centimetres, were made and tested. The concrete was proportioned 350 kilogrammes of cement to 1,200 litres of sand and gravel.

The fibres in tension were reinforced with six bars of 30 millimetres diameter. The fibres in compression were reinforced by two coils of interlacing spirals and formed of round bars of 7 millimetres diameter curved round with an internal diameter of 150 millimetres, and with a pitch varying from 30 millimetres at the centre of the span to 60 millimetres at the ends. Ten longitudinal bars of 6 millimetres diameter were placed in the spirals.

These beams could not be broken, and the test had to be stopped owing to the excessive lengthening of the tensile reinforcements and the great curvature of the beam which resulted. The cracks of extension stretched from the tension side to within 7 centimetres of the opposite compression face. The concrete envelope 2 centimetres thick which covered the spirals had almost disappeared.

It is certain, then, that a section of " béton fretté " less than 28 by 5 = 140 sq. centimetres has carried alone the compressive resultant of the couple of flexure. The bending moment having attained 32·660 kilogrammes and the leverage arm of the couple being 0·32 metre at most, the pressure was more than 102,000 kilogrammes and, therefore, the *average* pressure in the " béton fretté " was more than $\frac{102,000}{140} =$ 728 kilogrammes per square centimetre.

In a piece so reinforced one would be able to calculate the percentages in different ways. One would determine it by dividing the volume of metal composing the spiral reinforcement of a length of beam of 0·10 metre by the volume of a parallelopiped of the same length enveloping the spirals, and having the width of the beam or 28 centimetres. Its height of 164 millimetres is equal to the external diameter of the spirals. The percentage of total metal composing the reinforcement of the fibres in compression would come to 2.

The average resistance of 728 kilogrammes is altogether astonishing for a concrete with the proportion of 350 kilogrammes of cement and reinforced with a total percentage of 2. It is much larger than those of reinforced posts of the same percentage and loaded on the end.

(B) *Continuous Beam.*—A T-beam of three spans 12 metres in total length has been tested. The results which this gave agree with those of the experiments which have been mentioned, but a very lengthy note would be necessary to record this test and to show its consequences. We will not say any more respecting it here.

Crushing of Cylinders of Concrete Immersed in Water under Pressure.

In a communication to the Academy of Sciences, dated April 18th, 1904, some results of experiments made under the following conditions on 65 cylinders of mortar have been recorded :—

The cylinders were plunged for a moment in a bath of melted wax, which rendered the surface impervious. They were afterwards placed in the reservoir of a hydraulic press disposed in such manner that it was possible to simultaneously raise the hydrostatic pressure and to bring a mechanical pressure on the opposite bases of the cylinders.

The following table gives a result of the two experiments where the hydraulic pressure had attained a maximum value.

Percentage of cement. Kilogrammes.	Resistance to crushing of mortar immersed under water pressure of :			
	0	20	100	150 atmospheres.
300	74	227	523	645 kilogrammes
600	170	318	769	936 do.

The hydrostatic pressure exerted by the water on the impervious surface was not balanced by an internal pressure. It was expected to, and did, produce the same effect that a continuous spiral reinforcement would. The calculation applied to the results led exactly to the conclusions which had been deducted from the tests of the spirally reinforced prisms with regard to the connection between the pressure exerted on the bases of a prism and the lateral pressure which was necessary to balance its effects and prevent crushing.

That series of experiments has shown without possibility of dispute a deduction which had already been drawn in 1902 from the tests on spirally reinforced prisms.

The difference of the resistances of the mortars proportioned with 300 kilogrammes and 600 kilogrammes of cement has been 290 kilogrammes in water compressed to 150 kilogrammes, when it was only 96 kilogrammes under the zero pressure. We see further that this fact has led to attribute to the effects of the spiral reinforcement a double cause : the increase of the cohesion and a sort of intermolecular friction.

Tests on Hollow Cylinders.

It was important to prove that the spiral reinforcement produced no useful effect when the interior portion contained by the spirals was not solid. Some experiments which have been made prove that fact conclusively. It is not necessary to record them.

Number and Variety of Experiments mad on "Béton Fretté."

More than 260 tests have been made on mortar or on concrete spirally reinforced. The diameter of the cylinders or prisms tested has varied from 3 to 70 centimetres, the length from 8 to 400 centimetres, the proportion of cement from 300 to 1,100 kilogrammes per cubic metre, the percentage of metal from 1 to 14, and the age, at the moment of test, from 8 to 200 days.

The concrete has been sometimes mixed with a large excess of water and thrown as a liquid into the moulds, and sometimes made with a minimum of necessary water and rammed with great care.

Sometimes the disposition of the armatures has been well superintended with the greatest care, and sometimes it has shown irregularities which would not happen on any job properly managed.

The resistance recorded per square centimetre of section has been as high as 1803 kilogrammes, and the total load on one piece up to as high as 1,620,000 kilogrammes.

All these results obtained have confirmed the conclusions relative to the resistance of "béton fretté," which had been deducted in 1902 from experiences much less varied and few in number.

It will be seen later that the driving of piles which have been used in great number constitute in themselves some tests to destruction to an exceptionally large scale, and give to the laboratory experiments proof which will particularly appeal to practical constructors.

Chapter III.—Establishment of the Properties of "Beton Frette" other than the Ductile Resistance of the Concrete.

In the study of the shontenings which concrete armoured or spirally reinforced supports before rupture, one is forced to reject the non-homogeneous pieces of which one part crushes when the other, of which the deformations are measured, is still far from its ultimate resistance.

From the facts recorded in the first part of Chapter II. it follows that we are bound for this reason to reject the experiments of series D and D′ of Table I.

In the experiments made on homogeneous posts spirally reinforced which were not destroyed the deformation before rupture was always over 2 per cent.

In the record above of tests on cylinders of great resistance is noted an exceptional shortening of 12 per cent. observed in a cylinder formed of a very rich mortar, and strongly reinforced by spirals of iron wire not annealed, and therefore having a high elastic limit.

The ductility of "béton fretté" is still more remarkable in bending than in simple compression.

In the most deformed part the two prisms spirally reinforced of 20 centimetres initial diameter that are shown in Fig. 5 had a radius of curvature of about 6 metres. On the outside the lengthening was unable to exceed 1 per cent., as the concrete did not present visible cracks. Calculation allows it to be deduced that the fibres nearest to the centre of curvature had supported, without crushing, a shortening of about 20 per cent. The posts in question were made of concrete of ordinary quality, spirally reinforced by means of ordinary commercial steel, some identical posts having supported no more than 2 or 3 per cent. shortening in simple compression.

We can find the explanation of that surprising difference in the fact that the concrete of a bent piece deforms itself, and displaces itself under the protection of the metallic enclosure into a region where the pressures vary by insensible gradation, whereas in compressed pieces destruction is produced by escape between the spirals in passing immediately from maximum to zero pressure.

Whatever may be the cause of this fact, we must include it with this other, that the resistance of "béton fretté" would also seem to be greater in bending than in single compression.

In reference to tests on spirally reinforced beams, it has been shown that this fact results from a test of a spirally reinforced beam, and from it one can draw a second proof for the study of the molecular efforts that are assumed in the two posts of Fig. 5, the curves which they have taken and under which they were supporting about 300 kilogrammes of pressure per square centimetre.

It is important to remark that in these two pieces one part contained by the spirals was working under tension, while the other part supported considerable pressure.

Glass immersed in liquid compressed to some thousand atmospheres has recently been successfully bent as a ductile body, showing that the ductility under pressure exhibited by bodies so different as concrete and glass is perhaps a general property of solid bodies.

Modulus and Limit of Elasticity.

The statement published in 1902 in the "Génie Civil" contains a long experimental and theoretical study of the effects produced by the spiral reinforcement on the elasticity of concrete. A *resumé* of the results follows:—

(1) In the first loading the spiral reinforcements increase the modulus of elasticity less than longitudinal bars of the same weight would do. They much increase the limit of elasticity, or, more exactly, the limit of short extensions, as there is no sudden break in the curve of deformation.

(2) A prism spirally reinforced which had sustained the application of any load showed itself in the reloading and unloading under an equal or inferior load as a body perfectly elastic, and with a very high modulus of elasticity.

(3) If, after having submitted a prism spirally reinforced to a great load, in measuring the values of its modulus of elasticity we take away the spiral reinforcements and resubmit that prism to a load, in taking the same measures, the difference in results shows, in this case, an elastic effect of the spirals superior to the one which would be produced by longitudinal bars of the same weight.

Therefore there is a considerable difference between the elastic effects that the spirals produce in the first loading and in the reloadings and the unloadings. In the statement of 1902 this has been explained by the effects of the contraction of the concrete in setting, and we find the confirmation in the measures of transverse swelling of the spirally reinforced prisms. For further details that statement may be referred to.

In the experiments made in 1905 at Stuttgart the elastic effect of the spiral reinforcement has been found to conform to the results of 1902.

At the laboratory of the Ecole des Ponts et Chaussées some prisms have given similar results, but others have had moduli of elasticity much inferior to what was expected.

As for the limit of elasticity, the spiral reinforcement has always increased it in a notable proportion.

Without going into a delicate discussion, of which the conclusions would not perhaps be free from all criticism, the Commission on Reinforced Concrete has taken the part of admitting that the increase of the modulus of elasticity produced by the transverse armatures, and especially by the spiral reinforcements, being relatively small and imperfectly known, it was not able to advise this being taken into account, and it confined itself to giving for the calculation of the resistance to bursting some limits resulting directly from its experiments.

So as not to make this note too lengthy we must accept provisionally that wise solution in spite of the prejudice it might give to the employment of "béton fretté" in posts.

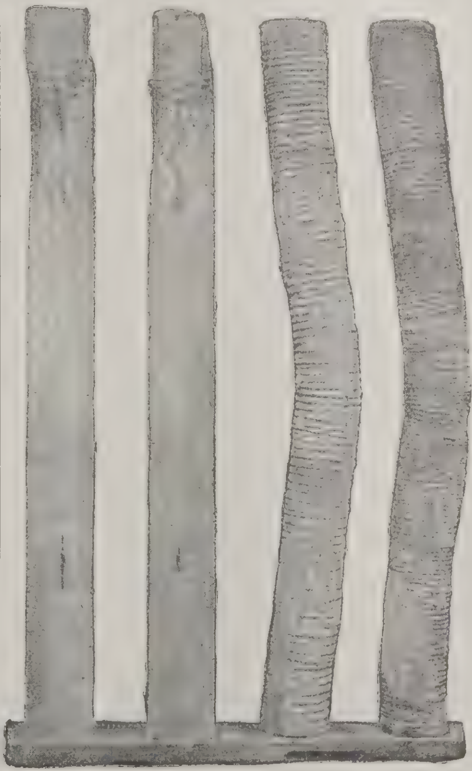
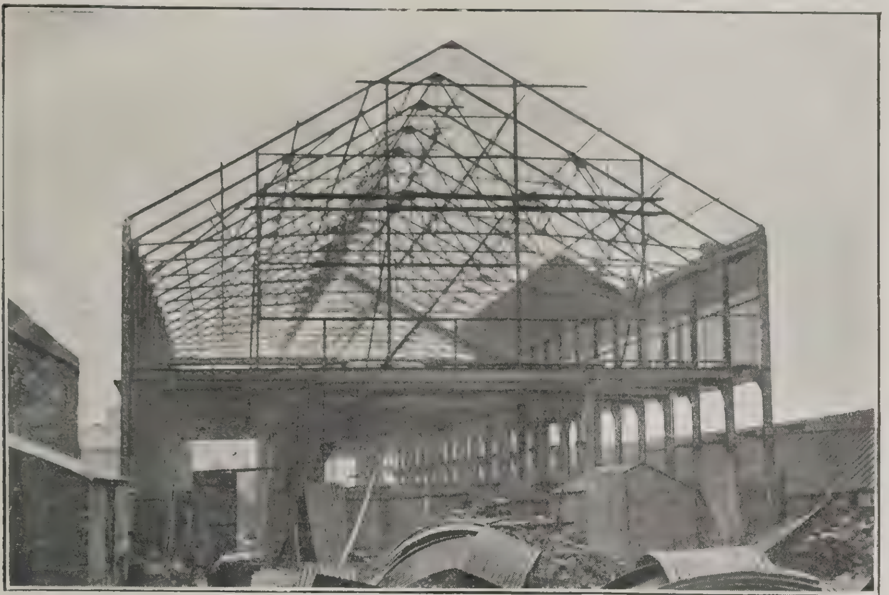


FIG. 5.—TESTS ON " BÉTON FRETTÉ."

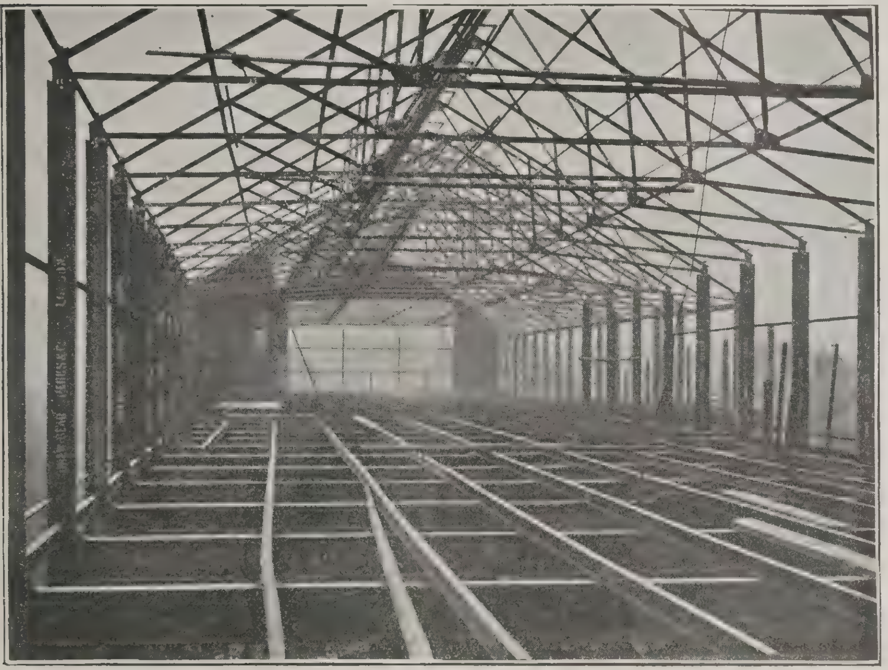
Bursting of the Concrete outside the Spiral Reinforcements.

The crushing of the external concrete which precedes that of the concrete core contained by the spirals constitutes a defect which it is necessary to avoid. It is important to determine the pressure which will cause this.

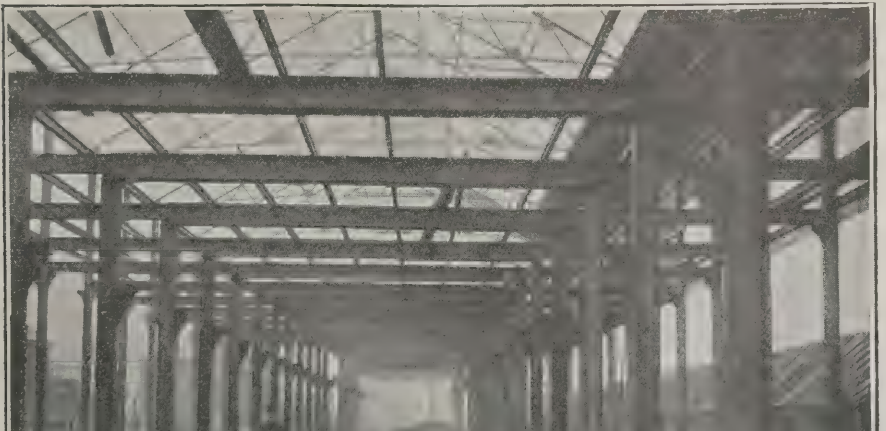
The load which has produced in the envelope the first cracks has exceeded on the average the resistance of concrete unarmoured by 70 per cent. in the experiments at Stuttgart and 30 per cent. in those of the Commission on Reinforced Concrete. This same load has much exceeded the crushing load of the posts containing the same weights of armatures of the



End View.



View of First Floor



View of Ground Floor.

GLAHOLM AND ROBSON'S WIRE ROPE FACTORY, SUNDERLAND.
W. AND T. R. MILBURN, FF.R.I.B.A., ARCHITECTS.

usual type in the experiments at Stuttgart, while it has been equal or inferior in the tests of the Commission.

There is similarity between these results and those obtained from the point of view of elasticity, and it must have been so. In fact the external concrete being one with the spirally reinforced concrete core which is much more resistant, the appearance of the shortenings that the envelope is unable to support, and, therefore, the appearance of the cracks, occurs much later when the spirally reinforced concrete has a higher modulus and a higher limit of elasticity.

The experiments of the Commission, which are the only ones which give the information on the shortenings until the appearance of the cracks, have evidenced a fact which has been noted.

The shortenings which the spirally reinforced posts have supported before the appearance of the first cracks have exceeded 60 per cent., on the average, the shortenings noticed with prisms reinforced according to the usual types, immediately before their sudden rupture.

In the presence of the discrepancy between the results obtained at Paris and Stuttgart on the subject of the pressure which produces the first cracks in the concrete outside the spiral reinforcements, the Commission on Reinforced Concrete has adopted a very wise solution. It has admitted that the pressure capable of producing the first damage exceeds only 20 per cent. the resistance of unarmoured concrete, and it has taken as the basis of its proposals that idea, which is much more unfavourable to "béton fretté" when it contains more metal.

Some further experiments, we hope, will allow the extent of the sacrifices which have been made on the side of safety to be determined.

(*To be continued.*)

A WIRE ROPE FACTORY AT SUNDERLAND.

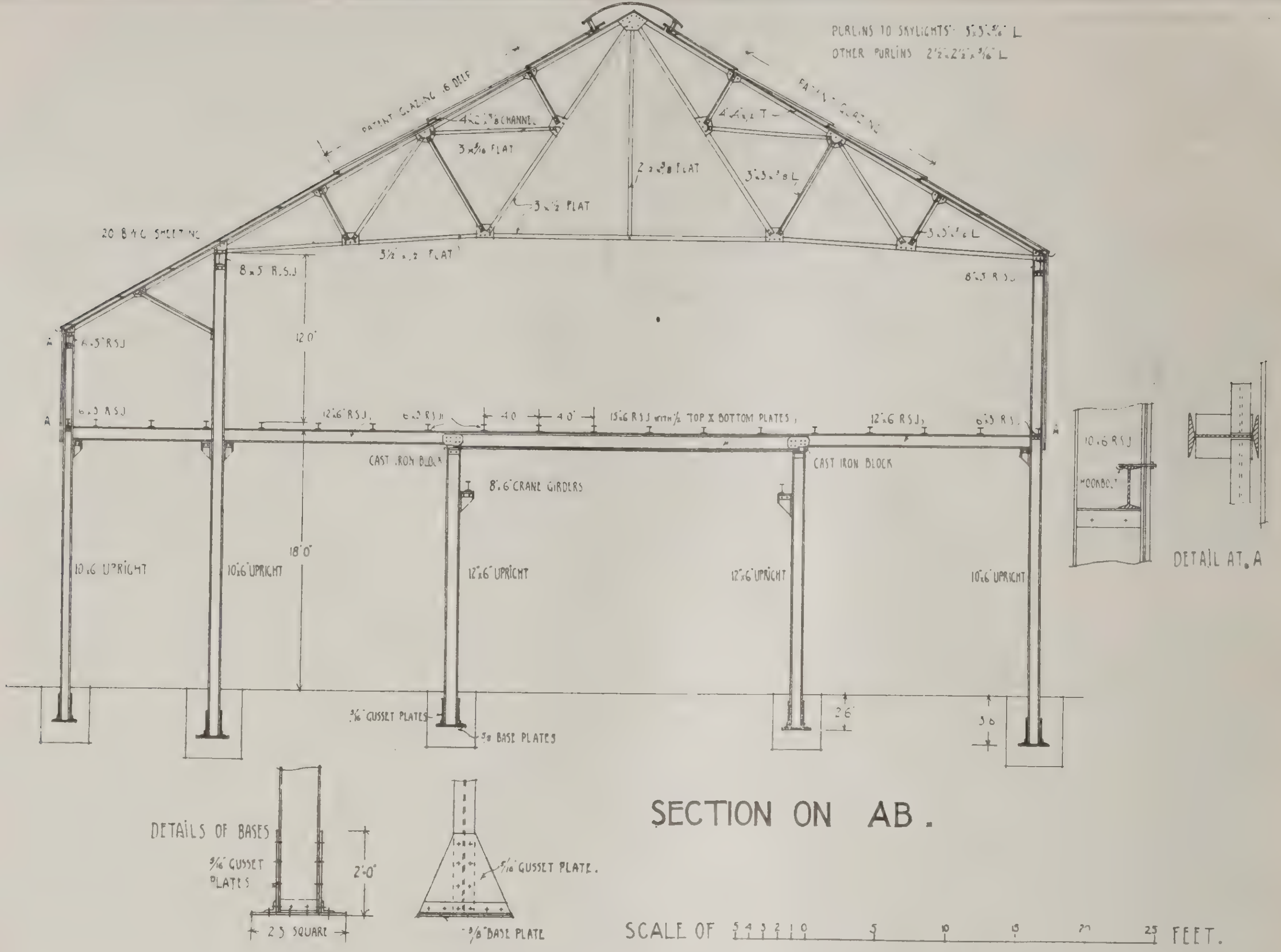
The new building for Messrs. Glaholm & Robson at Sunderland, here illustrated, is erected on some vacant land to the east of the firm's present premises. The structure is entirely of steel and concrete. The total length of the building is 292ft., and the width in the widest part 76ft.

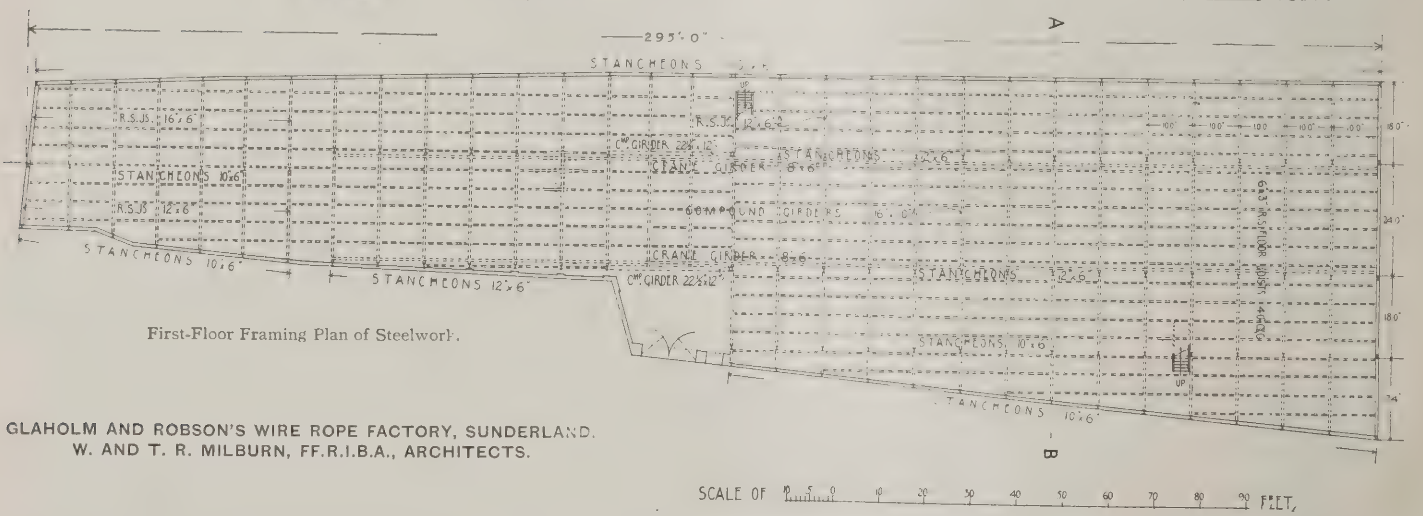
The stanchions are 12-in. by 6-in. uprights placed at 10ft. centres carrying cross plated girders which support light joists at 4-ft. centres. Upon these light joists is placed an expanded metal and concrete floor 5in. thick. The view of the first floor shows the steelwork ready to receive this reinforced concrete floor slab. The roof is framed of steel bars and covered with corrugated iron. The ground floor walls are of brick, and are fitted with Hope's casement lights.

The building is intended to be used for the manufacture of wire ropes, the heavy machinery being on the ground floor and the lighter machinery on the upper floor.

The contractor for the concrete work has been Mr. Joseph Huntley, of Sunderland. One-half of the steelwork was erected by Messrs. David Rowell & Co., of London, and the remainder by Messrs. Drew-Bear, Perks & Co., of London. The general contract and other work has been carried out under the management of Mr. Waugh, of Messrs. Glaholm & Robson.

The architects for the entire building are Messrs. W. and T. R. Milburn, FF.R.I.B.A., of Sunderland.





First-Floor Framing Plan of Steelwork.

GLAHOLM AND ROBSON'S WIRE ROPE FACTORY, SUNDERLAND.
W. AND T. R. MILBURN, FF.R.I.B.A., ARCHITECTS.

A BOOK ON STEELWORK.

We have to review a new book on steelwork in the shape of "Notes on Construction in Mild Steel," by Mr. Henry Fidler, M.Inst.C.E., who is the editor of "Rivington's Notes on Building Construction." This book is an addition to Longman's Civil Engineering series, and is intended to deal more with the practical than the theoretical side of steelwork design. It does not embrace the treatment of applied mechanics, theories of construction and calculations for structures only being referred to as incidental to the treatment of the subject.

The work undoubtedly contains a great deal of valuable information that it is well to have placed on record, but at the same time it is somewhat deficient in regard to steel-frame building construction. It is far too much given over to the record of steelwork designed for railway or marine purposes. In view of the increasing adoption of steel-frame buildings in this country a book dealing with this subject in a practical way would be extremely valuable at the present time.

The details of steelwork design illustrated in Mr. Fidler's book are generally correct enough in theory, but they are often not quite economical in practice. We should not criticise the book adversely if it set out to deal with the theoretical aspect and used the details as examples, nor if it claimed to be simply a record of interesting examples of steelwork. It is because the work claims to be a practical handbook to assist the draughtsman that we are inclined to think that it misses its aim to some extent. Much of the book is misleading to the practical student. The commercial factors which need to be considered in design are not adequately dealt with. A good many of the connections shown are not to be recommended, either being too weak or too elaborate.

After an introductory chapter on the manufacture and physical and chemical qualities of mild steel, the various rolled sections and riveted girder work, with remarks upon rivets are treated in detail. A further chapter deals with the practical design of columns and struts, and is followed by a chapter on roof construction. The use of mild steel and iron in marine engineering is next dealt with, and a final chapter is devoted to the protection of steel surfaces from corrosion.

"Notes on Construction in Mild Steel, arranged for the use of Junior Draughtsmen in the Architectural and Engineering Professions," by Henry Fidler, M.Inst.C.E. London: Longmans, Green & Co., 39, Paternoster Row, E.C.; price, 16/– nett.

DEFLECTIONS OF BEAMS UNDER ANY LOADING.

A Simple Graphical Method.

By Ewart S. Andrews, B.Sc. Eng.

It is often found desirable to obtain the theoretical deflection of a beam for cases other than those of central and uniform loading for which the formulæ are given. The following simple graphical method allows the deflection to be found for any kind of loading and for cases where the cross-section of the beam changes.

According to the ordinary beam formula we have

$$M=\frac{fI}{y} \text{ or } \frac{M}{I}=\frac{f}{y} \qquad (1)$$

where M is the bending moment, f the fibre stress in the beam, I the moment of inertia of cross-section and y the distance from the neutral axis to the outer fibre.

Now, when a beam is bent, its curvature, except in an exceptional case, varies for different points along the span. If we take a short piece of the beam, however, we may assume that the curvature remains constant for such short piece. We will also make the assumption made in obtaining the ordinary bending formula given above—namely, that cross-sections originally plane remain plane after bending.

Let Fig. 1 represent a very short piece of the beam, the amount of bending of which is much exaggerated for the purpose of illustration, and which is assumed to be straight before bending.

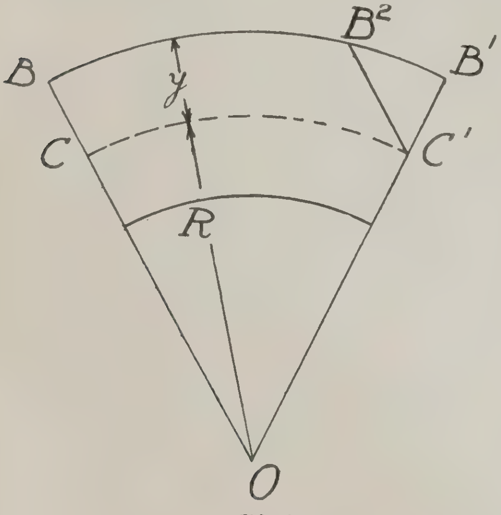


FIG. 1.

Then if CC^1 is the centre line and C^1B^2 is parallel to BC, BB^2 is the length of BB^1 before bending, and, therefore, B^2B^1 is the extension of the outer fibre BB^2 due to bending. The radius OC=R being assumed large and CC^1 being assumed small, we get:—

$$\frac{CC^1}{OC^1}=\frac{B^2B^1}{C^1B^1}$$

$$ie., \frac{CC^1}{R}=\frac{B^2B^1}{y}$$

$$\therefore \frac{y}{R}=\frac{B^2B^1}{CC^1}=\frac{B^2B^1}{BB^2}=\text{Unit strain at outer fibre}$$

$$=\frac{\text{stress at outer fibre}}{E} \quad \left[E \text{ being Young's modulus}=\frac{\text{stress}}{\text{strain}}\right]=\frac{f}{E}$$

$$\therefore \text{we have } \frac{f}{y}=\frac{E}{R}.$$

Combining this with equation (1) we get

$$\frac{M}{I}=\frac{E}{R} \text{ or } \frac{I}{R}=\frac{M}{EI} \qquad (2)$$

Therefore the radius of curvature of a loaded beam at any point is equal to the bending-moment at that point divided by EI.

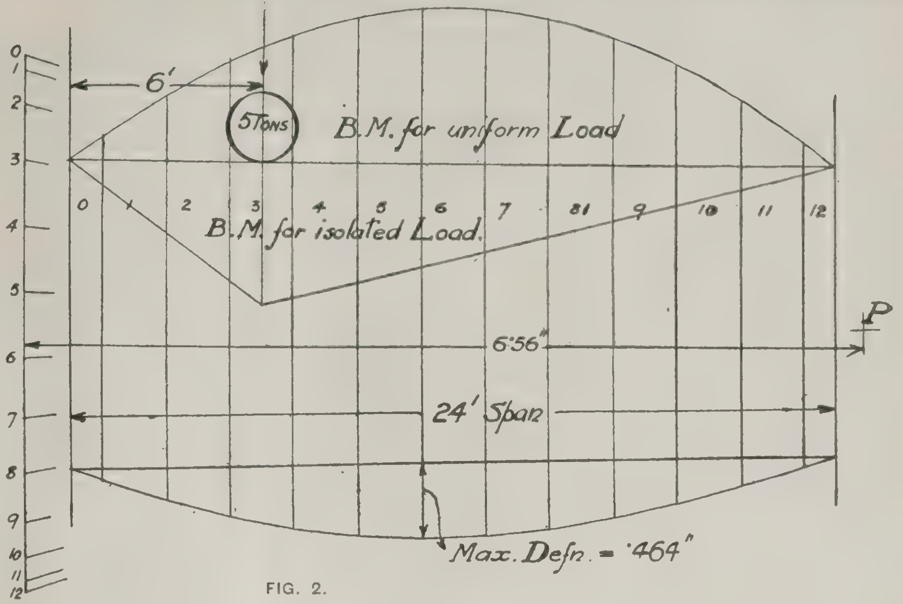


FIG. 2.

The quantity EI is called the *flexural rigidity* of the section. Now consider a deflected cable. It is well-known by the elementary principles of graphic statics that a loaded cable takes up the form of the bending-moment curve due to the load, drawn with a polar distance equal to the horizonal pull (H) in the cable. It can also be easily shown that the radius of curvature of the cable at any point is given by $\frac{I}{R}=\frac{p}{H}$, where p is the load per ft. run at the given point.

It follows from these two statements and from equation (2) above that *the radius of curvature of a beam at any point, and therefore the deflected form of the beam is the same as that of a cable of the same span loaded with the bending-moment curve of the beam and with a horizontal pull equal to* EI.

This is Mohr's theorem,

and the following worked example will show how it is applied in practice:—A 16-in.×6-in.×62-lb. rolled steel joist of 24ft. span carries a uniformly distributed load (including its own weight) of 8 tons and also an isolated load of 5 tons at a point of 6ft. from the left-hand support. Find the maximum deflection.

In this case E=12,500 tons per sq. in., I=725·7in.-units. $\therefore$ EI $=\frac{12{,}500\times 725{\cdot}7}{144}$ sq. ft.-tons=62,980 sq. ft.-tons. First draw the bending-moment curves for each of the loads, taking as linear scale, say 1in.=4ft., and bending-moment scale, say 1in.=20 ft.-tons (Fig. 2).

Now divide the bending-moment curve into a convenient number of equal parts, say 12, and draw the mid-ordinate of each part, treating these as the force lines. Then set these ordinates down a vector line 0, 1, 2, &c....12 to a reduced scale, say ¼th for convenience.

These lengths on the vector lines represent the *areas* of the corresponding portions of the bending-moment curve. Therefore, 1in. down the vector line represents 4×2×20=160 sq. ft.-tons, because each segment of the divided span is $\frac{24}{12}$=2ft., and the bending-moment ordinates are reduced ¼th when set down the vector line. Now take a pole P and draw the link polygon as in the ordinary graphical method of drawing bending-moment diagrams: then by Mohr's theorem given above this link polygon will be the deflection curve or *elastic line* of the beam. For the deflection curve to be on the linear scale the polar distance—*i.e.*, the horizontal distance of P from the base line—should be equal to EI on the sq. ft.-tons scale. $\therefore$ polar distance should be $\frac{62{,}980}{160}$ins.=393·7ins. This is obviously not convenient $\therefore$ take $\frac{393{\cdot}7}{60}$ =6·56ins. Then 1in. deflection curve represents $\frac{48}{60}$ins. deflection. The maximum or ordinate of deflection curve=·58ins.

$\therefore$ maximum deflection=·58×·8=·464ins.

This method is applicable to all cases. To make it clear the construction shown in Fig. 2 should be worked through.

In the case where the beam varies in section along the span the method is the same, but the bending-moment curve must first be corrected to allow for this variation. This is done as follows:—Suppose the moment of inertia of the maximum section is I_0. Now suppose at any given point along the beam the moment of inertia is I_x. Then the ordinate of the bending-moment curve at this point should be increased in the ratio $\frac{I_0}{I_x}$. This should be done for a number of points along the span, and the points thus obtained joined up to form the corrected bending-moment curve. The problem is then worked exactly as in the example, the value I_0 being taken in the expression EI.

Cement for Reinforced Concrete.—Messrs. Peters Bros., the well-known cement makers, of Wouldham Hall and Burham Works, near Rochester, Kent, and 34, Victoria Street, Westminster, are now making a special quality cement which they call P.P.P. cement, or "Peter's Perfected Portland." It is a much higher standard than the British standard specification, as will be seen from the following:—

FINENESS

On 100 x 100 a residue of only 5 per cent.
On 200 x 200 „ „ 20 „

TENSILE STRAIN.

Neat.	7 days.	28 days.
1 cement and 3 sand......	550 lbs. ...	650 lbs.
„ „	200 „ ...	300 „

LE CHATELIER TEST FOR EXPANSION.

24 hours—4.8 mm.

ANALYSIS.

Silica	21.90
Insoluble Residue	1.30
Oxide of Iron and Alumina	10.80
Lime	61.60
Magnesia	1.08
Sulphuric Anhydride	1.71
Carbonic Acid and Water	1.01
Alkalies, &c	60
	100.000

Views and Reviews.

Three Books on Reinforced Concrete.

Buel & Hill's "Reinforced Concrete Construction" has been revised and enlarged considerably in the second edition. The book is not on the same lines as most otherworks on the theory and design of reinforced concrete construction. It is more of a practical hand-book on American practice and experimental data. It would be even more serviceable if it had no other presentions, that offer a chance for criticism by comparison with other books on the theory of the subject. Its treatment of this branch is slightly too detailed to be useful as a helpful summary, while it is not thorough enough to form an adequate treatment of the theory. It appears to be too haphazard a collection of opinions expressed by various well-known authorities in the course of papers dealing with certain aspects of the subject, and commenting on the results of tests. We quite appreciate the utility of recording the various theories put forward by authorities, but they should either be given in their entirety or, if abstracted, should be put in proper sequence. Resumés such as those in this book are too bald and disjointed. The first part of the book, on design, would have been better if it had been shorter, with examples drawn from practical design, and if the data in the way of records of tests and abstracts from papers had been relegated to another chapter or to an appendix. As there are three appendices in this edition consisting of Professor Talbot's tests of 1903, the Watertown Arsenal tests of columns, and Mr. Richard T. Dana's method of proportioning ingredients of Portland cement concrete, it would have been quite appropriate to have done the latter. Part 2 of the work, dealing with representative examples, is the most valuable part of the book. This is chiefly reprinted from articles and illustrations that have appeared in the "Engineering News." The third part, namely "Methods of Construction," is also very valuable; it illustrates methods of centering and various special forms of reinforcement, and is again largely drawn from the "Engineering News." The second and third parts of the book were compiled by Mr. Hill, who was then one of the editors of the "Engineering News," but since the severance of Mr. Hill's connection with that paper, Mr. Buel has accepted the task of the revision of this and future editions.

A new edition has been published of Mr. L. J. Mensch's book which first appeared in 1904. This American book treats the subject in a popular way that renders it much more interesting reading to the beginner than the more theoretical works. It is entirely free from any mathematics. The only fault is that it deals far too much with the Hennebique system to be accepted as an unbiassed work. The author, in an introductory chapter dealing with the early history of the subject, refers to a small "row-boat" exhibited at the World's Fair in Paris in 1855. This he states was built by Mr. Lamont of a shell of cement mortar $1\frac{1}{2}$ins. thick and reinforced by a wire netting, and that it is still in service in a pond in Miraval, France. We suspect that this really has reference to M. Lam ot, but further details would be welcome. The author also states that Monier's patent for reinforced concrete dates from 1861. This is hardly accurate because the original patent only had reference to the construction of pots or tubs for shrubs, and it was not until several years later that the patent was extended to the construction of reservoirs, &c.

The book on the design of reinforced concrete arches by Mr. Leffler is an admirable example of what is now chiefly needed by designers—namely, a practical handbook on a special branch of the subject. It is very simply written, the theory being reduced to the narrowest limits, and the illustrations few and very clearly drawn on plates that fold out for easy reference. Part I. deals with the analysis of an arch; Part II. with the theoretic deductions; Part III. with unsymmetric arches; and there is a short appendix. The author has introduced several new features in his treatment of the design of arches. His method is graphical and is based mostly upon the work of Professors H. T. Eddy, William Cain, and M. A. Howe. A very simple method of designing a reinforced concrete section for combined thrusts and moment is given, and altogether the book is refreshingly short and to the point, yet thorough.

"Reinforced Concrete Construction": Part I.—"Methods of Calculation," by Albert W. Buel, C.E.

Part II.—"Representative Structures," and Part III., "Methods of Construction," by Charles S. Hill. Second edition. London: Archibald Constable & Co., Ltd. Price, 21s. net.

"Architects' and Engineers' Handbook of Reinforced Concrete Construction," by L. J. Mensch. Chicago: *Cement & Engineering News*.

"The Elastic Arch," by Burton R. Leffler. New York: Henry Holt & Co.

REINFORCED CONCRETE SYSTEMS.

XIII.—The Kleine System.

The Kleine system of constructing fire-resisting floors, roofs, staircases, &c., is not a reinforced concrete system of the ordinary type, but it has so many points of similarity and is certainly allied to reinforced concrete that we have deemed it advisable to include it within this series.

The system is used very extensively in Germany, and it is making rapid strides in this country. It was invented by Herr Johann Franz Kleine, of Berlin, formerly of Erbach on Rhine, architect-builder or "baumeister," as members of the profession are called in Germany. Mr. Kleine had, of course, to study the science of building construction in order to pass the Government examinations, but he possesses more than ordinary scientific attainment; for instance, he is a chemist of some ability.

Herr Kleine's first patent was dated, 1893 and his second patent was taken out in 1896. It will be seen, therefore, this was one of the earliest of modern scientific reinforced systems. The English company working the system commenced operations in April, 1906, and it will be seen from the list of works executed below that they have already carried out a large quantity of work.

The Kleine system is a combination construction using steel joists or girders for the main beams, the slabs between being reinforced with flat steel bands for small spans, and occasionally flat iron rods for wide spans with heavy loads. The essential feature of the Kleine slab construction is the use of hollow terra-cotta blocks or solid bricks with steel reinforcement in the longitudinal joints embedded in cement mortar. Upon the bricks ballast concrete is deposited to give increased resistance to compression when required, and when this is done the bricks are placed alternately flat and on edge to ensure a perfect bond between concrete and bricks. Figs. 1 and 2 illustrate typical construction for smaller spans. In the former view, hollow porous terra-cotta blocks are shown in use, but it is possible to use ordinary solid common bricks, as illustrated in Fig. 2. This is often found advantageous in localities where the hollow blocks cannot easily be obtained.

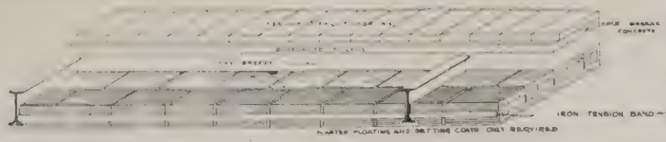
Lightness of the Construction.

To those unfamiliar with the principles of such construction, the lightness of the Kleine construction is undoubtedly startling and it is difficult perhaps for them to realise that this system is a stable one and suitable for heavy loads. Such persons, however, are convincingly answered by the simple statement that the Kleine system has now been used successfully for a number of years and that numerous severe tests have been conducted upon specimen floors. To those familiar with reinforced concrete it is apparent that the theoretical principles upon which the construction is founded are not only thoroughly logical and conservative, but even offer additional security.

In the first place, the hollow terra-cotta blocks or solid bricks will take a certain amount of compression in themselves and, indeed, for corridors and similar spans with light loads, the blocks are used without any concrete filling.

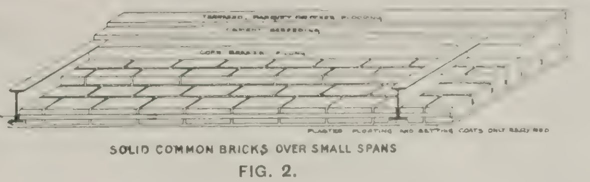
Safeguards against Bad Workmanship.

The whole of the tension is taken by the wrought-iron reinforcements, which are embedded in Portland cement mortar composed of three of sand and one of cement. There is no danger of this mortar being of such bad quality as to impair the workmanship. In this respect it is claimed that there is an advantage over the construction of a floor in plain reinforced concrete, for disastrous accidents have proved that concrete may be very badly made or affected by external influences, so that when the centering is withdrawn or even after many years a floor may collapse or deflect considerably. This risk of failure is increased when an aggregate, such as coke breeze or clinker, is used, for it is difficult to ascertain the exact antecedents and chemical composition of such aggregates which, beside the acid they contain, are extremely porous and allow moisture to penetrate and attack the embedded reinforcement. In the Kleine system, however, the tension bands, being embedded in cement mortar, a close and impervious material, are adequately protected against corrosion. As is shown in Figs. 1 and 2 a coke breeze filling can be used upon the hollow blocks or solid bricks without any possibilities of detrimental action to the reinforcement. Where, however, the depth is limited, and considerable compressive resistance is required from the concrete, a ballast aggregate, as shown in connection with the diagrams of floors suitable for mill or factory construction, illustrated in Fig. 3, is, of course, superior. Here, again, the system overcomes a disadvantage of ballast concrete. It is well known that such concrete is not particularly fire-resisting. If the aggregate is of large size (that is to say, if it is not broken small) it will splinter under heat, and furthermore, it allows heat to pene-



HOLLOW BRICKS OVER SMALL SPANS.

FIG, 1.



SOLID COMMON BRICKS OVER SMALL SPANS

FIG. 2.

trate rapidly for some distance into its interior. Thus from both points of view, it exposes the iron reinforcement in case of fire. With the Kleine system, however, as is obvious, the hollow blocks or solid bricks form the underside of the floor, and protect the reinforcement from the action of heat. The hollow blocks when made of porous terra-cotta have no tendency to fly when heated and under the application of water, as from a hose.

No Displacing the Reinforcements.

The Kleine system offers another point of theoretical advantage over reinforced concrete construction of the ordinary type as regards the placing of the reinforcement. Where dry concrete is rammed into position the reinforcements are liable to be displaced from their correct position, and as an inch or two in the effective depth of the floor reduces the strength materially, the importance of the point can be easily understood. In the Kleine floor, however, there is no liability of the tension bands being displaced from their correct position as designed. Once placed in position, they cannot be disturbed. The cement mortar is put in the joints by means of a trowel, and the joints then grouted. There is no ramming to affect the tension members.

Less Weight.

Still another advantage claimed for this system is that the dead load of the floor is much less than a plain reinforced concrete floor. When hollow terra-cotta blocks are used, as is commonly the case, the weight of the floor over short spans up to 9ft. is not more than 25lbs. per ft. super. This results in considerable saving in steelwork of main beams, and also in the wrought-iron reinforcement of the floor slab.

Sound Proofing.

Again, it is common knowledge that a solid concrete floor is by no means soundproof. Such floors conduct sound readily, and in buildings subjected to much traffic overhead, or where quietude is a first essential, hollow floors must be adopted. With the Kleine system, where the hollow blocks are used, the sound resistance of the floor is greatly increased. If a further safeguard is required in this direction a hollow floor can be constructed as shown in Fig. 4.

No Side Thrust.

The bricks do not form a flat arch, and there is no side thrust on the steelwork or walls. Tests have shown this conclusively. Where concrete is used to give an additional thickness and additional strength in compression, it is prevented by an arrangement of the blocks or bricks from exerting any thrust on the walls. This is done by placing some of the blocks or bricks on the flat, and others on edge, as shown in Figs. 2 and 3. In ordinary floor-slab construction with concrete, it is known that a concealed arch is developed when loaded which tends to push the walls out. Additional strength is thereby obtained, but it is not always an advantage.

No Condensation.

A general characteristic of terra-cotta or brick protection for the underside of a concrete floor applies to the Kleine system. Concrete is cold and impervious, and condensation occurs with a moist atmosphere. This is found to be a serious disadvantage in places where much steam or moisture is present, such as spinning mills, weaving sheds, breweries, laundries, dyeing and cleaning works, &c. Clay, on the other hand, has a certain amount of porosity, and gives an insulation against cold and heat, thus preventing condensation.

There is little or no vibration of the floors, as shown from one or two factories where shafting and pulleys have been bolted through the floor without causing noticeable vibration.

Practical Construction.

The Kleine system is rapidly constructed. The centering is removed after a few days in the case of small spans, large spans for heavy loads taking longer, and as soon as the centering is removed the brick soffit is ready for immediate plastering. The centering is light and simple, and strutting is practically never required. The boards are placed at right angles to the longitudinal joints containing the reinforcements, so as to avoid the possibility of a joint between the boards coming directly under a longitudinal joint in the floor slab, which if not quite close would allow the mortar for embedding the reinforcement to slip through. In laying the floor, ordinary bricklayers are usually employed for putting the hollow blocks or bricks into position. They lay these in mortar, both in the longitudinal and horizontal joints between the blocks. Kleine floors are not constructed to fixed centres. No inconvenience from delay is caused by irregularity in spacing. Openings can

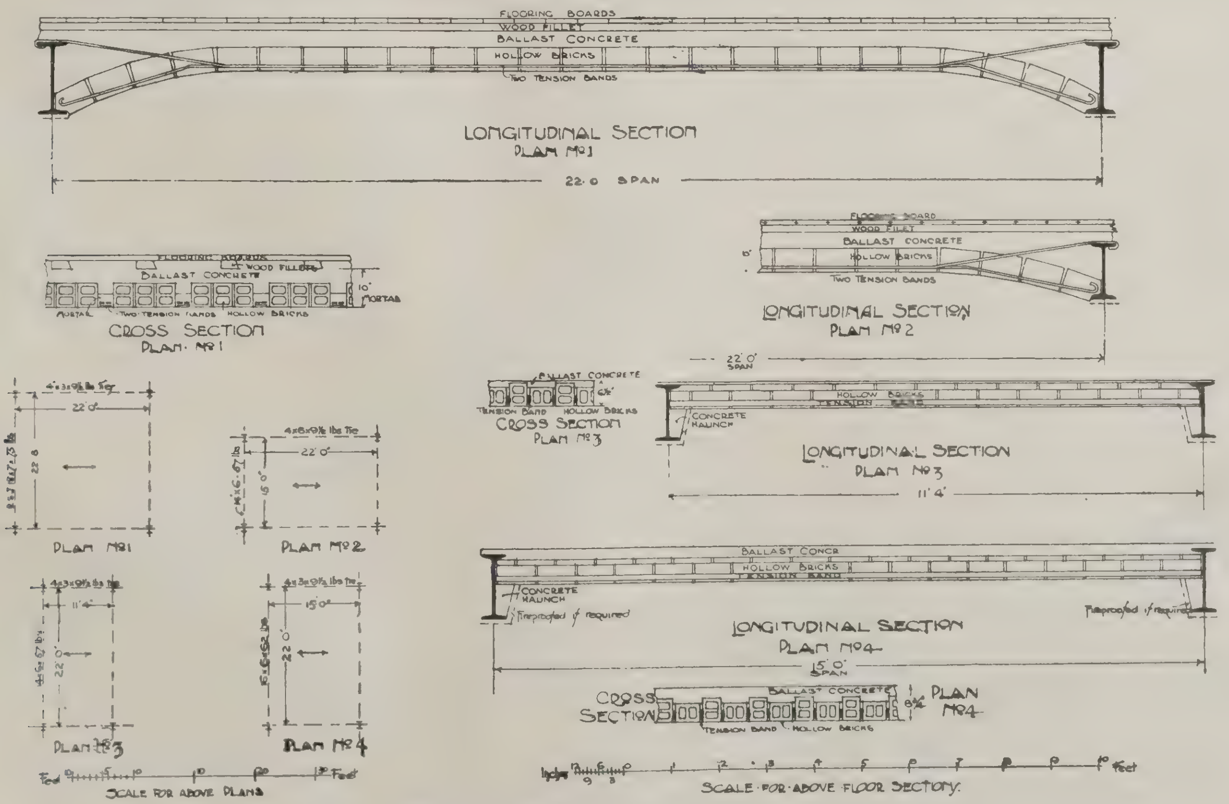


FIG. 3. TYPES OF KLEINE FLOORS FOR MILLS (VARIOUS SPANS).

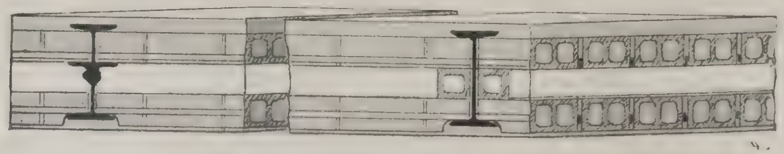


FIG. 4. DOUBLE KLEINE FLOOR.

be left or cut in Kleine floors with ease and safety, even in the immediate proximity of the heaviest machinery.

The Kleine Patent Fire-Resisting Flooring Syndicate, Ltd., will not entrust work to agents or sub-contractors. All the work done by the Syndicate is guaranteed.

Spans.

Kleine floors can be constructed for any load required, but for great loads the spans, the patentee recommends, should not exceed 10ft. to 12ft. for economy. Fig. 3 shows a floor of 22ft. span in which two tension bands are placed side by side, one being cranked up at the ends, and the other cranked down, as shown in the longitudinal section, the upper rod being turned over the joists and thereby gaining a certain amount of continuity.

The Kleine system has been used extensively for the construction of roofs, staircases, and other parts of ordinary buildings. The patentee and subsidiary companies have not applied the principles of the construction to engineering designs. They have been content to confine themselves to buildings, although it is obvious that the system could be used for the flooring or decking of bridges, &c., and a little in this way has been done.

Roofs.

In the construction of roofs the hollow blocks or bricks are laid with the longitudinal joints containing the reinforcement between the upright rafters of the roof and thus horizontal to the line of the roof. Mansards and ordinary pitched roofs are thus easily constructed, and Fig. 5 shows a typical construction. Domes have also been constructed on the Kleine system.

Staircases.

The construction of staircases presents no difficulty. A type with hollow blocks and concrete risers and treads is shown in Fig. 6, but other staircases have been built with solid bricks and brick risers and treads. Such staircases are supported by steel joists and are not cantilevered.

Numerous load tests

have been conducted, as we stated above, on Kleine floors. The Syndicate working the system deserve every praise for calling attention to the anomalies ordinarily seen in the testing of floors, where bricks, bags of cement, pig-iron, &c., are piled up with the desire of giving a distributed load, but form concealed arches throwing most of the superincumbent load upon the supports without really testing the floor. In the tests conducted on Kleine floors the Charlottenburg system of ensuring an evenly distributed load is usually employed. This we illustrated in our issue for November 14th in describing a test conducted on a Kleine floor slab. A layer of sand is placed directly upon the floor slab and in putting on the load care is taken to ensure discontinuity. In the above-mentioned issue we also described a fall test on a bare brick slab constructed on the Kleine system. This showed that heavy weights would have to be dropped several times upon a floor before they broke the blocks or bricks, and even then would not fall through because the tension bands would sustain them.

As regards fire tests

several have been conducted in Germany giving uniformly successful results. Actual fires have occurred in buildings with Kleine floors without resulting in their destruction. It is sufficient in this connection to state that the Kleine system attained the following awards: In 1893 the first prize was awarded in Berlin by the Tribunal appointed by the German Fire Insurance Companies; in 1896 the only Gold Empress Medal awarded in the building section at the Berlin Technical Exhibition was secured; in 1901 the only Gold Empress Medal for fireproof building at the International Exhibition of fire-protection and life-saving appliances at Berlin was obtained by the Kleine system.

Calculations.

As regards the bases of calculations for the system, the floors are ordinarily treated as independent beams. In the case of floors constructed as that of 22ft. span, illustrated in Fig. 3, a certain amount of continuity is allowed to reduce the bending moment. Wrought-iron is used for the reinforcement as a rule, although occasionally round steel rods are employed. The section of iron adopted for the tension bands is a flat, as this adapts itself best to embedding in the joints between the blocks or bricks. It is sometimes asserted as the results of a few tests that flats or squares do not show as great adhesion as rounds, but any deficiency in this direction is met in the case of the Kleine system by the superior adhesion offered by the cement mortar. The ends of the bands are also turned at right angles either against the blocks or bricks or as shown in Fig. 3. Care is taken to wet the bricks or blocks before use so as to prevent moisture being withdrawn from the mortar by the porous nature of the material, so as not to injure adhesion to the steel and to the blocks or bricks. In floors of smaller spans there is ample resistance to shear, but in floors of greater spans, such as that of 22ft. in Fig. 3, the cranked up reinforcements at the ends resist shear.

Contracts Carried Out.

As regards the many floors, roofs, &c., that have been built, it is impossible for us to spare the space to give even a complete list of those erected in the past twelve months in England, and still more so would it be impossible for us to give even an abbreviated list of the more important buildings where the Kleine system has been used in Germany. A complete list for that country would occupy many pages of this journal, but we may mention the following notable buildings in Berlin and suburbs as having been carried out in 1903-4:—

Barracks of the Alexander Guard Regiment, Royal Prussian State Bank, Royal Charité Hospital (extension), Royal Museum of Technical Arts, Royal Prussian Ministry of Education, Singer Sewing Machine Factory, Imperial Patent Office, County Buildings, Charlottenburg; bank buildings for Discontogesellschaft.

These few buildings total 100,000 metres of Kleine floors.

As regards England, the following are a few of the most important buildings erected since April, 1906:—

Imperial, Hotel, London; warehouse, Hatton Garden (Niven & Wigglesworth, architects); motor works, Eden Street, S.W.; cabinet works, Tottenham (S. Clifford Tee, architect); factory, High Wycombe (S. Clifford Tee, architect); warehouse, Shoreditch (W. Stone, architect); W. H. Smith & Son's factory, Letchworth; Messrs. Mappin & Webb's new premises, Oxford Street, W.; new Westminster Trust Building, Gt. Chapel Street, S.W.; factory premises, Goldsmith Row, N.E.; warehouse, Manchester (Charles Heathcote & Sons, architect); Manchester and County Bank, Altrincham; Daisyfield Mill, Blackburn (Stones & Stones, architects-, County Court House, Antrim; bakery premises, Cambridge (J. Carter Jonas & Sons, architects).

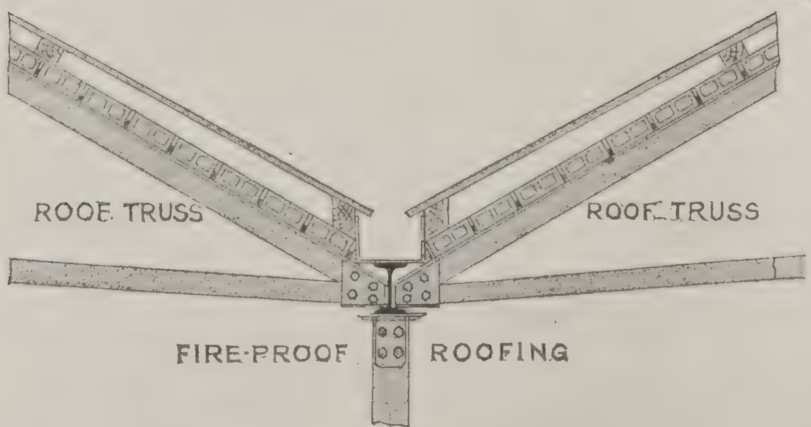


FIG 5, KLEINE SYSTEM: ROOF CONSTRUCTION.

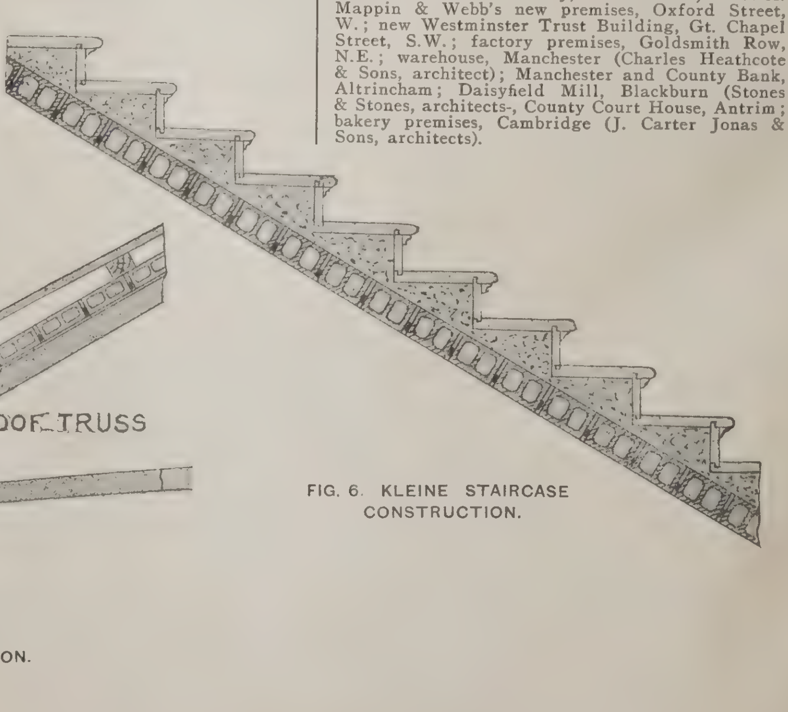


FIG. 6. KLEINE STAIRCASE CONSTRUCTION.

THE BUILDERS' JOURNAL

AND ARCHITECTURAL ENGINEER.

May 22, 1907.

CONCRETE AND STEEL SUPPLEMENT (MONTHLY).

Vol. XXV. No. 641.
6, Great New Street, Fetter Lane, London, E.C.

SPIRALLY REINFORCED CONCRETE AND ITS APPLICATION.

By A. Considère, Inspecteur-Général des Ponts et Chaussées (retired).

(Continued from p. 45.)

Chapter IV.—Explanation of the Results of Experiments, and Consequences which follow.

Effects produced by Longitudinal Reinforcements.

Although the study of the effects of longitudinal reinforcements is not the object of this article, it is well to endeavour to offer an explanation. If we could succeed in this, we could give the clue to this apparently abnormal phenomenon, and so could aid the experimenters and the constructors to determine the conditions which would ensure to armatures of this kind their maximum useful work.

The resistance furnished at every moment by the longitudinal bars is evidently proportional to their shortening, and therefore their total efficiency at the moment when a reinforced piece is about to crush, depends on the maximum shortening that the concrete which surrounds them is able to support. Now, the final shortening of the concrete is still more variable than its resistance. Like that, it increases with the proportion of cement and with its age. The shortening depends much less than the resistance on the proportion of water in the mixing. The dry concretes if rammed seem worse from the point of view of shortening before rupture.

Certain concretes support before they crush shortenings exceeding 1 millimetre per metre, which are sufficient to cause the longitudinal bars to develop stresses near to the limit of elasticity of from 22 to 24 kilogrammes, but there are others which crush as soon as the shortening amounts to ·4 millimetres to ·5 millimetres. To the resistance of the concrete longitudinal bars cannot in this case add more than 10 to 15 kilogrammes per square millimetre of their section, including the initial compression which the contraction of the concrete imposes on them, and which varies within very wide limits.

The result can be worse still if the rupture of the concrete is forced, either by the eccentricity of the loads or by the bad disposition of the reinforcement causing, especially in their extremities, tendencies to disintegrate which are not sufficiently counteracted by the transverse links. Experiments have established this fact.

In any case, it seems evident that in a prism of which the transverse reinforcements would not be strong enough to form a sort of network, longitudinal bars, if disposed in the best way in the best concrete, would not be able to supply before rupture a resistance superior to their limit of elasticity, because stronger forces would become manifest only by very great shortenings, and would much exceed the stresses which concrete so reinforced could sustain without crushing.

The links or cross-pieces add their effects to those of the longitudinal bars, and their characteristics vary sensibly between the same limits as those of the usual types. The experiments of Prof. Bach have shown that these are even more efficient when they are very close together.

These considerations seem sufficient to enable us to understand the results of the experiments mentioned before.

Effects of Spiral Reinforcement.

The communication published in 1902 in "Genie Civil" contains a long theoretical study of "béton fretté," which it is not necessary to reproduce here. I would confine myself to recording the nature of the resistance of "béton fretté" and to giving the conclusions drawn directly from the experiments above stated.

The shell of concrete which surrounds the spiral reinforcement, splintering under a load much inferior to that which produces the crushing of the concrete core contained by the spiral, does not play any part in the final resistance. Therefore in a study of that resistance we will only take into account the section of the core limited by the cylinder circumscribed by the helicoidal axis of the spirals. In what is to follow immediately it will accordingly only be a question of the spiralled core, except to indicate later on how we can also derive the resistance from the total section by sacrificing a part of exactitude to simplicity.

Everybody knows the considerable resistance of the boxes of sand which contractors employ to carry the centering of bridges, and one cannot assign to it any other cause than the friction which is produced between the grains of sand. It is natural to think that something, if not identical, at least similiar, to this friction takes place between the molecules of the solid bodies of which a spiral reinforcement counteracts the lateral escape

On the other hand, experiment has proved that "béton fretté" is able to support deformations at least twenty to thirty times greater than those which always cause the crushing of concrete which is not spirally reinforced. If, then, one constructs curves of the deformations by taking the shortenings as abcissas and the pressures as ordinates, we shall have for ordinary armoured concrete a curve stopped sharply at the abcissa ·0008 metres, for example, and for "béton fretté" a curve which would be continued up to abcissa ·02 or ·03 metres. Whatever may be the form given to the curve of deformation of "béton fretté," it were most probable that its ordinates would not stop abruptly from growing while its abcissas were increasing considerably beyond ·0008 metres, and that, consequently, the concrete would supply, in the spirally reinforced pieces, a resistance of cohesion much larger than in the others.

In 1902 I had formulated the opinion that it must have been so, but I did not have enough proofs to include it in my conclusions. Actually, the fact cannot be contested: it is brought notably to light by the difference of the resistances of cylinders of different proportions tested in water, a difference which increases with the pressure of the surrounding liquid. Consequently I am led to modify my conclusions of 1902, and to attribute to the increase of cohesion a part of the resistance thought to be due entirely to the intermolecular friction.

The great ductility of "béton fretté" is another consequence.

Whereas in armoured concrete of the usual types the longitudinal bars can, as it has been said before, only produce a fraction, sometimes feeble enough, of the resistance of which they are capable because the concrete which surrounds them disintegrates before they have sustained sufficient shortening, they always supply a resistance a little higher than their limit of elasticity in concrete of which the shortening before rupture much exceeds the elastic shortening of the metal.

The examination and comparison of the results of all the known experiments have allowed the exactitude of these deductions to be verified, and the following rules to be formulated:—

Resistance compared to the section of the core contained by the spirals.—The resistance to crushing of the core of a spirally reinforced prism which is subjected to the pressure at the ends exceeds the sum of the three following elements:

"1. The proper resistance of the concrete plus 50 per cent.

"2. The resistance of the longitudinal reinforcements working to their limit of elasticity.

"3. The resistance of a longitudinal reinforcement of which the weight would be 2·1 times greater than the weight of the spiral reinforcements, and which would be working to its limit of elasticity."

To be able to verify the exactitude of this rule we have given under another form in Table II. (p. 33) the results of those spirally reinforced prisms figuring in Table I. in Chapter I., which have not been destroyed by lateral bending. Even then the figures have been added relating to prism No. 19, which was destroyed by bending, so as to leave no large gap between prisms containing very different percentages of metal. Instead of the resistances per square centimetre, as in the preceding table, the total resistances have been indicated, so as to simplify the calculations.

For the prisms 23, 25 and 27, of which the lengths were 2·3 metres, 2·6 metres, and 3 metres, there were no plain concrete test prisms of the same length. It is by interpolation that the figures of column 4 have been calculated by the average of the resistances of the test pieces of plain concrete of 2 and 4 metres in length.

The figures of column 9 represent, for each prism, the section of a fictitious longitudinal bar of which the weight would be equal to that of the spirals.

The figure of 2,400 kilogrammes indicated at the head of column 7 is the customary value of the limit of elasticity of mild steel generally employed in constructions.

The figure of 5,100 kilogrammes of column 8 is the product of 2,400 by the co-efficient of useful work, 2.1 of the metal of the spirals.

The figures of column 9 are the sums of the figures given in columns 4, 6 and 8. They indicate, therefore, the resistances of the various posts calculated according to the rule which is formulated above.

In column 10 the maximum effective loads carried by the various prisms are given. In column 11 the differences greater or less than the calculated resistances and the resistances obtained are recorded. Columns 12 and 13 contain the percentage which represents these differences compared with the loads sustained.

It seems useful to present in a similar table the results obtained for the longitudinal prisms shown in Table I. in attributing to the longitudinal reinforcements the same resistance of 2,400 kilogrammes as in the spirally reinforced posts.

In examining the results account must be taken of the fact that the concrete of the prisms armoured or spirally reinforced is not absolutely identical with those of the plain concrete test pieces, and that the quality of the metal may vary from one bar to another. Therefore, we must not take into account the irregularities which are due to these differences.

One can consider as very satisfactory the results that were obtained for spirally reinforced prisms by the application of the rule stated above. The largest variance was 11 per cent. above and 7 per per cent. below. Generally the calculated resistances are inferior to the observed resistances. The average difference is 3 per cent. above.

For the posts armoured with longitudinal bars with cross-pieces or links, the result is different. The resistances observed are very irregular, and, on the average, much inferior to the resistances calculated. The variance below comes as high as 39 per cent. It is on the average 10 per cent. The result would be still more unfavourable if from these tables had not been excluded the five posts which figured in the first under No. 1, and in which the reinforcements have added nothing to the proper resistance of the concrete because their extremities were separated by spaces of seven millimetres between the rams of the hydraulic press.

The form of the table has been chosen so as to show directly how the total calculated resistances of the spirally reinforced posts compare with the facts. If we isolate the effects of the metal we must deduct the resistances of the plain concrete posts from the total resistances. It appears from this that the calculated values of the effects of the metal exceed the observed values by 40 per cent. on the average in the ordinary armoured posts, and are inferior by 5 per cent. in the spirally reinforced posts.

We find thus indirectly the fact asserted directly and related in the paragraph on p. 42 dealing with Prof. Guidi's experiments that in the tests made at Paris and Stuttgart the metal of the reinforcements of the ordinary types has not given an average resistance equal to the limit of elasticity of 2,400 kilogrammes per square centimetre, but only $\frac{2{,}400}{1{\cdot}4} = 1{,}700$ kilogrammes, or 17 kilogrammes per square millimetre.

Formulæ which interpret the rule given above for the calculation of the resistance of the spirally reinforced concrete are as follows :—

Letters S s, and s' represent respectively the tranverse sections of the core between the spirals, the longitudinal armatures and the longitudinal bar which has the same weight as the spirals; c represents the proper resistance of the unarmoured concrete per square centimetre and C the resistance to crushing of the spirally reinforced core. We have the equation :—

$$SC = 1.5Sc + 2400s + 5100s'$$

If we represent by P and P′ the percentages of metal $\frac{s}{S}$ and $\frac{s'}{S}$ we derive the following formula :—

$$C = 1{\cdot}5c + 2400P + 5100\ P$$

Resistance compared to the Total Section.

As we shall see later, the resistance of "béton fretté" must be calculated not only with reference to the crushing, but also to the bursting of the shell of concrete enveloping the spirals, and, in that respect, we can only consider the total section. It will be most convenient also to adopt this section for the calculation of the resistance to crushing.

In the case where the relation of the section of the core to the total section will be equal to 1 to 1·5, a formula which will give the value of the resistance compared to the total section is :—

$$C = c + 2400 + 5100p'$$

where p and p' represent the percentages compared to the total volume. c is equal to 160 kilogrammes for ordinary concrete.

The comparison of the sections being generally in the neighbourhood of 1 to 1·5 one will be able to employ that simple formula in the preliminary designing.

Rule for Calculation given in the Instructions and the Circular of the French Minister of Public Works.

By the terms of the circular of October 20th, 1906, we can, in the calculation of the resistance to compression of prisms spirally reinforced in accordance with the prescriptions that it recommends, replace the longitudinal bars by a uniformly distributed volume of concrete 15 times greater, and the spirals by a volume of concrete 32 times greater than that of the metal.

On the other hand, article 4 of the instructions appended to that circular prescribes that, to the section of concrete so reinforced, a pressure shall not be imposed greater than ·28 of the resistance at the age of 90 days, which is reckoned at 160 kilogrammes in article 4 of the circular for concrete of the ordinary quality containing 300 kilogrammes of cement per cubic metre.

Therefore the maximum that in view of danger of crushing has been fixed for the pressures of "béton fretté" is :—

$$\text{Kilos}:\ 160 \times {\cdot}28\,(1 + 15p \times 32p')$$
$$= 44{\cdot}8 + 672p + 1430p$$

If these figures are compared with those which are given in the formula indicated above as expressing the resistance to crushing referred to the total section, we notice that the factor of safety ensured by following the indications given by the Minister of Public Works is almost exactly $\frac{1}{{\cdot}28}$ or about 3·57 for the effect of the two kinds of reinforcements, as well as for the resistance of the concrete.

For prisms reinforced with longitudinal bars with tie-pieces of the usual types, the equivalent co-efficient in concrete of the longitudinal and tranverse armatures together can, according to the terms of the instructions, vary from 8 to 15, according as the dispositions given more or less cause the metal to produce its total efficiency. An examination of the preceding table allows us to see that that indication is in accordance with the results of experiments, and that the maximum of 15 will be very rarely admissible unless some improvement is made in the disposition of the longitudinal reinforcements and their links.

One might be surprised that the ministerial instructions have made dependent upon the quality of the concrete the resistance which the metal gives, but we shall find this justified if we consider the facts related above, and the explanation which has been given.

In short, the resistance given by the longitudinal bars depends upon the maximum shortening that the concrete is able to sustain, a shortening which generally increases with the resistance. Experiment tends to confirm this, and the comparison of the coefficients of prisms 5 and 6 is particularly instructive in this respect.

On the other hand we have seen that the spiral reinforcement gives to the concrete an increase proportional to its resistance, and, moreover, it is evident that the concrete resists much better the pressures which tend to make it escape between the spirals when it is of better quality.

Resistance to Rupture by Bending under a Central Load.

Euler's formula allows us to calculate the resistance to rupture by bending of pieces compressed at their ends, under the condition that they are straight and central to the axis, and that their modulus of elasticity does not vary notably within the limits of pressure which are taken into consideration.

The formulæ of the Rankine type take into consideration to a certain extent the alteration of the elasticity taking place under great pressures, and give some results which concord much better than those of Euler's formula with the real resistances for pieces relatively short, but their perimeter must vary with the relation of the modulus of elasticity to the resistance to crushing. It is only under that condition that these formulæ give the same results as Euler's formula for very long pieces to which that last-mentioned exactly applies.

It is perceptibly so with posts reinforced with longitudinal bars with cross-pieces of which the resistance and the modulus of elasticity increases almost in the same proportion when the percentage of metal is increased. Therefore, in the ministerial instructions, the use of Rankine's formula for calculating the resistance to rupture by bending has been indicated.

The case of the "béton fretté," which has not been considered, presents much greater difficulties for the following reasons :—

The modulus of elasticity does not increase in the same proportion as the resistance when the percentage of the spiral reinforcement is increased, and therefore the perimeter of the formulæ of the Rankine type ought to be a complex function of the percentage of the metal. On the other hand, the loads which one can impose on the spirally reinforced pieces being relatively great, their resistance to rupture by bending depends on the diminutions which the modulus of elasticity sustains under great loads, and Euler's formula could only be employed with the complications which I have indicated in 1902.

The Commission on Reinforced Concrete could not undertake the theoretical study of a question so difficult; it limits itself to deducting from experiment some direct information. If the results do not allow the question to be so closely determined as we could wish, they have the advantage of being less open to criticism than a theoretical study.

Wishing to give to this article a practical character, I have limited myself to giving, in regard to this subject, a summary of the work of the Commission with some explanations.

Posts are always destroyed by crushing when they are very squat, and by rupture by bending when they are very long; but for those of which the dimensions conform to the ordinary conditions we can, if we wish, make them so that they are liable to be destroyed by crushing by making the spiral reinforcement weak, or by rupture by bending by making the spiral reinforcement heavy. Therefore for posts of a determined ratio of length to diameter there is a certain value of the percentage of metal to which corresponds the passage from one mode of rupture to another.

Regarding the cost, there is no advantage in exceeding this percentage limit as the resistance to rupture by bending, which is inferior to the resistance to crushing for heavily reinforced posts, and which consequently is the only one concerned, increases only slowly beyond this limit.

For the verification of the dimensions of compressed pieces from a point of view of rupture by bending, the percentage limits have an importance which results from the following proposition :—

" To be certain that a post spirally reinforced with any percentage will not fail, it is sufficient to keep its load, at the same time, below its resistance to crushing and below the resistance of the post with reinforcement at percentage limit having the same ratio of length to diameter.

In short, if the percentage of the said post is equal or superior to that of the post reinforced with the percentage limit, the exactitude of the proposition is evident. If, on the contrary, the percentage is smaller, the carrying out of the first condition will prevent it being liable to crushing, and, on the other hand, the rupture by bending will not interfere since the resistance to rupture by bending of spirally reinforced posts diminishes slower than their resistance to crushing when one reduces the percentage of metal. The two resistances being equal for posts with percentage limits, the resistance to rupture by bending is evidently superior to the resistance to crushing for posts not so strongly reinforced.

To resolve the problem of rupture by bending it is accordingly sufficient to determine the resistances of posts with percentage limits having the ratios of length to diameter which are usually found in structures. To do so with complete exactitude numerous experiments are necessary. The Commission on Reinforced Concrete has only tested 16 posts of 20 centimetres diameter, of which th elength varied from two to four metres, and of which the ratio of length to diameter was therefore between 10 and 20, but, guided by the results of previous experiments, it has almost exactly hit the percentage limits, since, for each ratio of length to diameter the rupture is produced by crushing in certain prisms and, in others, by bending. Yet, of the proportion of the two kinds of ruptures, it results that the percentages adopted are a little too high for short posts and a little too low for long posts.

In order to utilise the results given by these experiments, it has been necessary first to eliminate the influence due to the differences in quality of the concrete. The resistances of posts have been reduced to those which would have been, if, in all, the concrete had had the resistance of 160 kilogrammes that the ministerial circular gives to concrete containing 300 kilos. of cement per metre cube in practice.

For posts of which the ratio of length to diameter was...	10,	11·5,	13,	15,	17,	20
and having a percentage of spirals of	3·5,	2·6,	2·05,	1·64,	1·3,	1·0
and a percentage of longitudinal bars of	1·4,	1·15,	0·91,	0·70,	0·80,	0·90
the resistance has been at least ... ... kilos	400,	356,	320,	280,	260,	240

After having determined the values which it is convenient to allow for the factor of safety, one would be able to deduce from those figures to be given in a paragraph to follow dealing with this subject, the limits which, in view of rupture by bending, one must put upon the loads of spirally reinforced posts.

Practical Resistances of Posts in Buildings.

The experiments made by the Commission have been carried out on posts simply propped against the parallel rams of the hydraulic press. One might be inclined to think that the posts used in buildings are placed in a more favourable condition from the point of view of rupture by bending, because they are solidly connected with the floors, but that is not the case. The foundations sometimes undergo irregular subsidences, and, under the action of unsymmetrical loads, the floors impose on the posts flexures which increase their fatigue. On the other hand the concrete of the floors sustains the contraction due to the setting and the variations of temperature cause, specially during the winter, some horizontal displacements, often important, at the heads of posts whose bases are rigidly fixed to the ground.

These causes of fatigue produce molecular forces much greater, as the posts are shorter and as they have stouter sections. Their effects are evidently much more formidable, as the materials employed are less ductile—that is to say, less able to sustain deformations without rupture.

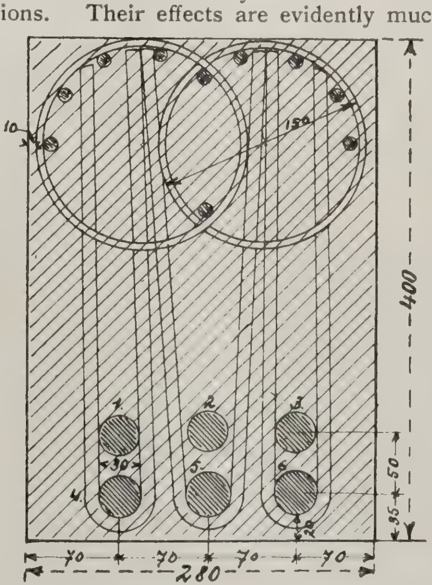


FIG. 6. CROSS-SECTION OF A SPIRALLY-RE-INFORCED BEAM.

(The loading test on this beam was dealt with in Chapter II. of the article on p. 43 in our last "Concrete and Steel Supplement.")

The posts are accordingly exposed to two dangers of absolutely different nature : the rupture by bending properly speaking, which threatens specially the slender posts and the exaggeration of the molecular forces resulting from the imposed flexures, which are much more to be feared when the posts are very stumpy. The gravity of these dangers varies much with the nature of the reinforcements.

For posts armoured in the usual way, the ministerial instructions admit that the tendency to rupture by bending does not reduce the resistance as long as the value of the ratio of length to diameter does not exceed the figure already so rarely attained of 20, and experiment proves that we could admit a limit still higher. We can say then that the danger of rupture by bending, properly speaking, is able to exist only very exceptionally for armoured posts. On the contrary, in consequence of their small ductility, armoured posts can be put in danger by the imposed flexures. Under the same conditions this danger is much greater as the posts are more stumpy.

For armoured posts and exposed to flexures of determined amplitude, the resistance attains, without doubt, its maximum for an average value of the ratio of length to diameter, and decreases as well, according as it is reduced or increased.

For the spirally reinforced posts the situation is very different. They have such ductility that the greatest flexures which might occur would not exercise a sensible effect on the resistance to crushing of the core, and could only accelerate the splintering of the envelope in the limited regions where the curvature would have its maximum value. (See paragraph regarding a test with eccentric loading, p. 43.) On the contrary, rupture by bending might be feared for the spirally reinforced posts if the pressure imposed upon them were not reduced at the same time as their ratio of length to diameter was increased. Below in the paragraph relating to "limits of forces," the rules which it is convenient to observe to avoid any danger on this point will be given precisely.

The question of the resistance of the posts is accordingly very complicated by reason of the danger of rupture by bending in certain cases, and of forced deformations in others. Fearing that the analysis of the fatigues is not always possible, the Commission on Reinforced Concrete has proposed, and it appears opportune, to maintain, in every case, the average pressures imposed on the posts below ·6, ·7, or ·8 of the pressures which are authorised for the pieces supporting central loads according as these posts are placed at the salient angles of buildings, in the other points of the façades, or under the floors between symmetrical spans. This limitation is fixed without prejudice to those which result from the prescriptions relative to rupture by bending.

Resistance to Crushing of the Envelope of the Spiral Reinforcement.

From this point of view the results of experiments have already been indicated; they must be borne in mind in considering the conclusions which we are about to deduce.

The pressure which produces the first cracks in the concrete shell which covers the spirals exceeds the resistance to rupture of the concrete not spirally reinforced, much more as the percentage of the metal is greater and generally from 30 to 70 per cent. The Commission on Reinforced Concrete has, however, very prudently adopted a uniform increase of 20 per cent., and we shall follow its example.

The shortenings that the spirally reinforced posts sustain before the appearance of the first cracks exceed by at least 60 per cent. those which would cause rupture of concrete not reinforced.

Factors of Safety.

It is an axiom that never does the destruction of works result only from the exaggeration of the expected loads. For the posts, for instance, one is obliged to come to the conclusion that this is so, taking into consideration that the authorised loads never exceed a quarter or one-fifth of the normal resistance. The principal causes which contribute to bring about the destruction of works are the bad workmanship, the dynamic forces, and also the deformations imposed and not foreseen.

Regarding bad workmanship and faulty disposition, the superiority of "béton fretté" results from the figures recorded in tables I. and II. The resistances shown are indeed much more regular for spirally reinforced posts than for posts armoured in the usual way.

It is important to call attention to the following fact, which tends to prove the comparison of the resistances of posts Nos. 5 and 6, and which has been established, *à priori,* in the first paragraph of chapter IV. The useful effect of the longitudinal armatures with the customary cross-pieces or links depends on the ductility of the concrete, which varies nearly always in the same sense as its resistance. Therefore, it follows that when the concrete requires the greatest assistance, the longitudinal armatures give it the least.

It is not so with "béton fretté" This results from the comparison of the results of the posts Nos. 14 and 15, and especially of the special experiment made to verify this fact and related in the paragraph on p. 43 dealing with the test of concrete used in a fluid state. It has already been proved, *à priori,* that it must be so.

The superiority of "béton fretté" is again greater from the point of view of dynamic forces; in fact the active resistance of solid bodies is the sum of the products obtained in multiplying the deformations that they can sustain until ruptured by the corresponding resistances. It varies, therefore, almost proportionately to the ductility.

Regarding the superiority of "béton fretté" from the point of view of the effects of flexures imposed by the external connections, it is not necessary to mention it again. In order to appreciate the consequences which may result from it, it is sufficient to look at figure 5.

The guarantees of safety in construction depend therefore on two elements: the resistance and the ductility of the materials of which they are made. One would be inclined to object perhaps that, in the classical works, mention is made only but little of the resistance, but that is only a fiction, and the long experience of constructors has, on the contrary, brought them to take into account, in a very large measure, the ductility. In fact, for works in stone or brick which are able to support without damage only very small deformations, it is usual to adopt very high factors of safety of 6 to 10, and if recently some smaller factors have been admitted in the arches of large bridges, it is because some special precautions have been taken.

In constructions made of ductile steel, the usual factor of safety is, on the contrary, rather small. It decreases on 2·5, or sometimes to 2 when we impose forces of 10 to 12 kilogrammes on steel of which the elastic limit varies from 22 to 26 kilos. We know, in fact, that the destruction of works is near at hand when that limit is attained in the essential parts.

Without doubt, the very high value of the factors of safety admitted for masonry and brickwork is in part justified by the greater probability of bad workmanship, but, on the other hand, it would be logical to take into account the fact that works in stone or brick do not suffer much from vibrations and of other dynamic forces, and are not exposed in a short time to such alterations as rusting and loosening of the rivets.

It seems only possible therefore to explain the customs of designers by taking into account the ductility. For, take again a post for simple example, it is evident that a horizontal displacement of half a centimetre imposed at a head of a stumpy support in masonry would greatly endanger its existence when it would not sensibly diminish the resistance of a post of steel or of "béton fretté" of the same longitudinal and transverse dimensions.

These considerations lead us logically to adopt, as regards the crushing, a factor of safety much less for "béton fretté" than for ordinary armoured concrete. Instead of adopting this solution, the Commission on Reinforced Concrete has done exactly the contrary, as is proved by the figures of table No. 2, and the ministerial instructions are on this point in conformity with its propositions. It was wise to do so by reason of the innumerable applications which have been made of armoured posts, whereas the employment of "béton fretté" is relatively recent. But the logic of the matter is indisputable, and it appears probable that very soon one will be able to utilise more completely the properties of "béton fretté."

In order to appreciate the value which it is convenient to admit for the factor of safety from the point of view of splintering of the envelope of the spirals, one must not lose sight of the fact that it only produces some reparable damage, announcing considerably in advance the approach of danger, and indicating the endangered points when it is possible to strengthen them.

One must be very prudent in admitting, in this respect, in accordance with the ministerial instructions the factor of safety of two, which is applied to the tensions of the metallic armatures of the concrete with regard to the limit of elasticity of the metal, of which, however, the exceeding will produce in constructions, not only damage, but grave disorders soon followed by destruction.

Limits of Forces.

Conforming to the methods adopted in the ministerial circular, we shall express the limits of pressure as a function of the resistance to crushing R indicated by the estimate for concrete not reinforced at the age of 90 days.

(1.) *Limits of pressure in respect to crushing.* The factor of safety admitted, from this point of view, in the instructions is $\frac{1}{0{\cdot}28}$, or, in other words, 3·57. In consequence of that indication, and of the co-efficients of equivalence of the metal fixed in the circular, the maximum pressure authorised is, for concrete not reinforced, 0·28R, and for "béton fretté" $0.28\left(1+\frac{15v}{V}+\frac{32v}{V}\right)$, where V is the total volume of the prism, *v* and *v′* are the volumes of the longitudinal bars of metal and of the spiral reinforcements contained in the volume V. (See paragraph above in regard to the "rule for calculation given in the instructions, and the circular of the French Minister of Public Works."

(2.). *Limits of pressure in respect to rupture by bending.* The experiments of which the results serve as bases to the propositions, being small in number, and having been carried out with more care than usual on the works, the Commission has adopted, with regard to these results, some factors of safety higher than 4. For the heavily loaded posts I propose to slightly increase again these factors in rounding the figures, and to admit that for the posts of which the ratio of length to diameter is 10, 11·5, 13, 17, or 20, the pressure must not exceed 0·60, 0·54, 0·50, 0·44, 0·40, or 0·37 of the resistance R of the concrete not reinforced and aged 90 days, however high may be the percentage of metal. For ordinary concrete of a resistance of 160 kilos., the corresponding pressures in kilos. are 96, 86, 80, 70, 64, or 59.

(3) *Limit of pressure in respect the cracking of the envelope.* The pressure must never exceed 0·60R, however high may be the percentage of the metal. For ordinary concrete the absolute limit is 96 kilogrammes. We will remark that the limit of pressure is the same for the prisms of a ratio of length to diameter of 10 from the point of view of rupture by bending and of the cracking of the envelope of the spiral reinforcement. Therefore it is useless to make fresh experiments with the object of studying the resistance to rupture by bending of the prisms, of which the ratio of slenderness is less than 10.

Conditions which must be fulfilled by "Béton Fretté."

It is important to precisely define the conditions which must be fulfilled by "béton fretté" in order that the preceding rules may be applicable.

(1.) *Concrete.* "Béton fretté" can be allied to the metals which have a limit of elasticity lower than their limit of resistance to rupture. This is the character of ductility, the importance of which has been shown before. However, there is no advantage in this when the difference between these two limits exceeds a certain measure, and we could only fully utilise the considerable resistance to crushing of strongly spirally reinforced concretes when they have limits of elasticity sufficiently high.

These last-mentioned limits depending, in a large measure, on the quality of the concrete, it follows from what has been said, that it is rational and advantageous to raise the quality of the concrete at the same time as the percentage of metal when the last exceeds certain limits.

But, in order to improve the quality of the concrete, it is not sufficient to increase the percentage of the cement, it is necessary to look after the making, the more as the concrete is richer in cement, and to limit the proportion of water in mixing so that the concrete may usefully sustain a strong ramming.

It is only under that condition that we can with certainty obtain some limits to the splintering of the envelope exceeding 250 to 300 kilogrammes per square centimetre, which allows of the imposition on the strongly spirally reinforced concrete of pressures of 125 to 150 kilos.

(2.) *Reinforcements.* The longitudinal reinforcements of "béton fretté" effectually increase its modulus and its limits of elasticity, and have therefore a special utility in heavily loaded pieces for the reasons which have just been indicated.

These reinforcements play another *rôle* of great importance.

The experiments related on page 41 prove that we can give to "béton fretté" a considerable resistance to crushing without the assistance of longitudinal reinforcements, but it is under the condition of employing some spirals with very small pitch so as to prevent the escape of the concrete between them. That disposition may render difficult the ramming of the concrete. It is useful from this point of view also to employ longitudinal bars sufficiently numerous and resistant which complete the net-work, enveloping the concrete and allowing of the increase of the pitch of the spirals.

It would be difficult to give the rules which would be applicable in all cases. Generally we can in the meantime use the following, which have been formulated by the Commission on Reinforced Concrete, and which are in part reproduced in the ministerial instructions.

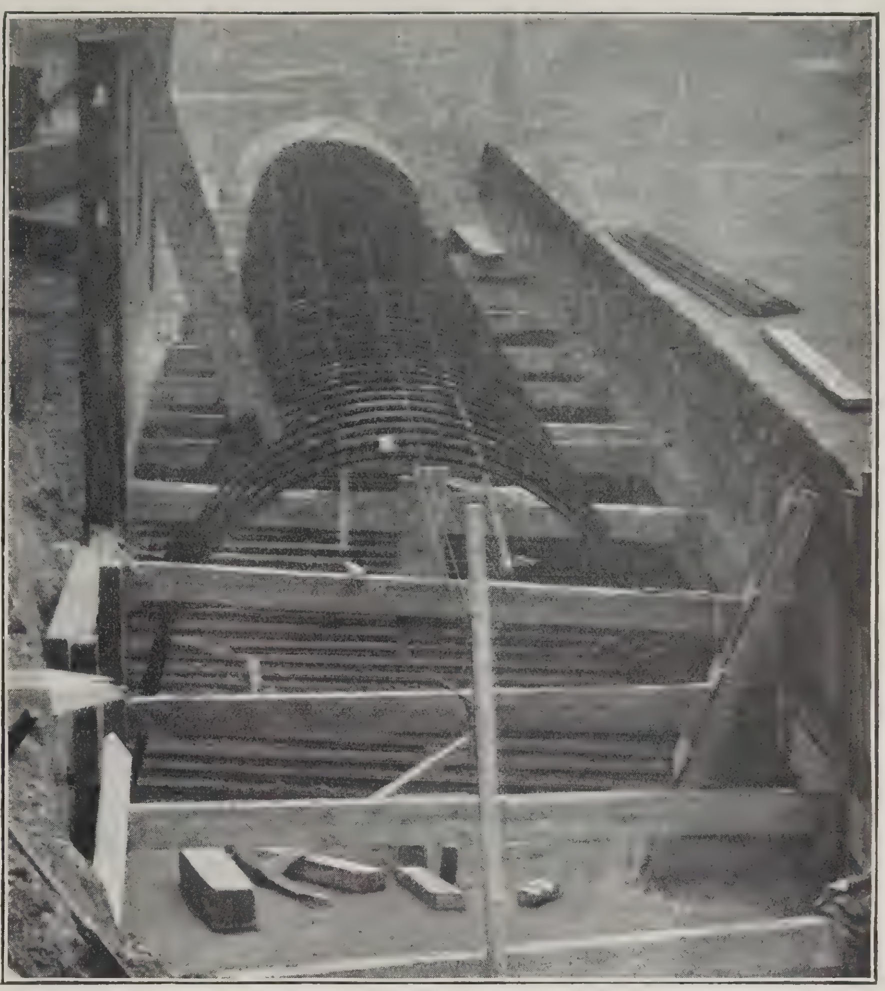


FIG. 1. REINFORCED CONCRETE SEWER AT ACTON, LONDON, W., IN COURSE OF CONSTRUCTION.

"When concrete of the ordinary quality with a percentage of 300 kilos. of cement is employed, the spacing between the

spirals from axis to axis must not exceed	$\frac{e}{5}$	$\frac{e}{6{\cdot}5}$	$\frac{e}{8}$
when the estimated pressure per square centimetre is (in kilogrammes)	50	80	100

where e is the least transversal dimension of the spirally reinforced piece.

"The longitudinal bars must be six in number at least, and for preference eight. Their volume must be at least equal to $\frac{1}{200}$ of the volume of the concrete without being able to go below the third part of the volume of the spirals."

The spiral reinforcement must further fulfil the following conditions:

The projection of the spirals on a plan perpendicular to the axis of the prism must be nearly circular or elliptical.

As it is proved by the experiments related in the paragraph referring to "tests on hollow cylinders" on page 44, the spirally reinforced core must be solid, or at least present only voids of little importance.

Again, the spirals must be well formed and unable to be opened under the action of the lateral pressure that the compressed concrete exerts on them.

It is possible to make spirals circular and welded together, but this method is costly, and the welds present no real security unless the resistance of each has been tested. In any case, the local heating of the metal in order to make the weld reduces its resistance. Besides, just as with all the independent spirals, the welded spirals must be fixed in place individually, and even in that case they may be put out of place during the ramming of the concrete. If the workmen are trusted to place them at equal distances apart and not to omit any, we are exposed to serious mistakes.

One can also employ spirals independent, and not welded, of which the extremities are anchored and penetrate into the core to the necessary depth to ensure their being fixed, but that disposition does not present complete guarantees, and requires the employment of supplementary metal to form the anchors.

The helicoidal spirals escape these criticisms much better when they are longer. But in the pieces moulded horizontally, such as piles, beams, arches and the vaults of bridges, spirals of 60 metres length are employed, these being made by rolling directly on a cylinder the bars which the works deliver in rolls.

In the posts moulded vertically it would be difficult to employ spirals so long. The bars that are made into spirals are generally eight to ten metres in length.

The joints being in every case few in number, we can without much cost give them an excess of solidity by putting closer together the extremity of these successive coils.

Of all the test prisms which have been so manufactured, not a single one was destroyed by a joint.

When the spirals are unrolled it is easy to control their regularity before putting them in the mould. In order to maintain them in the place they have to occupy, it is sufficient to tie them at various points to the longitudinal bars.

For these different reasons I consider it necessary to discard the use of independent spirals, and to utilise exclusively helicoidal spirals in the applications which will be mentioned later.

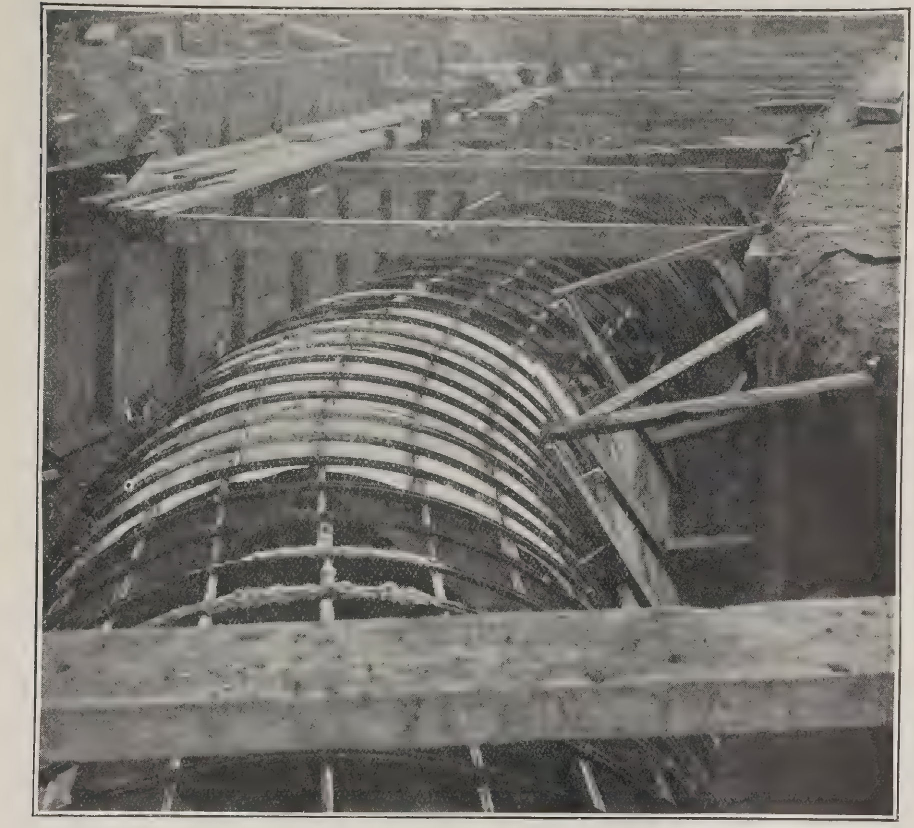
(*To be concluded.*)

A REINFORCED CONCRETE SEWER.

The reinforced concrete sewer in Avenue Road, Acton, the construction of which we illustrate by three photographic views, has been designed and constructed by the Columbian Fireproofing Co., Ltd., of 37, King William Street, E.C., for the Urban District Council of Acton. The capacity of the sewer is equal to that of a 4-ft. 6-in. diameter pipe.

As the sewer was required to be constructed very near the surface of a road subject to heavy traffic, it was deemed advisable to adopt such a section as would give as much height as possible from top of sewer to surface of road without diminishing the sectional area. A section having a semi-circular crown and segmental invert was therefore adopted.

The sewer extends almost the whole length of Avenue Road, the greater part of which runs under the footpath and the remainder under the roadway. The part under the roadway is designed to carry the weight of a heavy steam-roller, about fifteen tons, and is reinforced with 2-in. Columbian cruciform bars, the thickness of concrete at crown being 6ins. The part under the footpath is reinforced with 1-in.

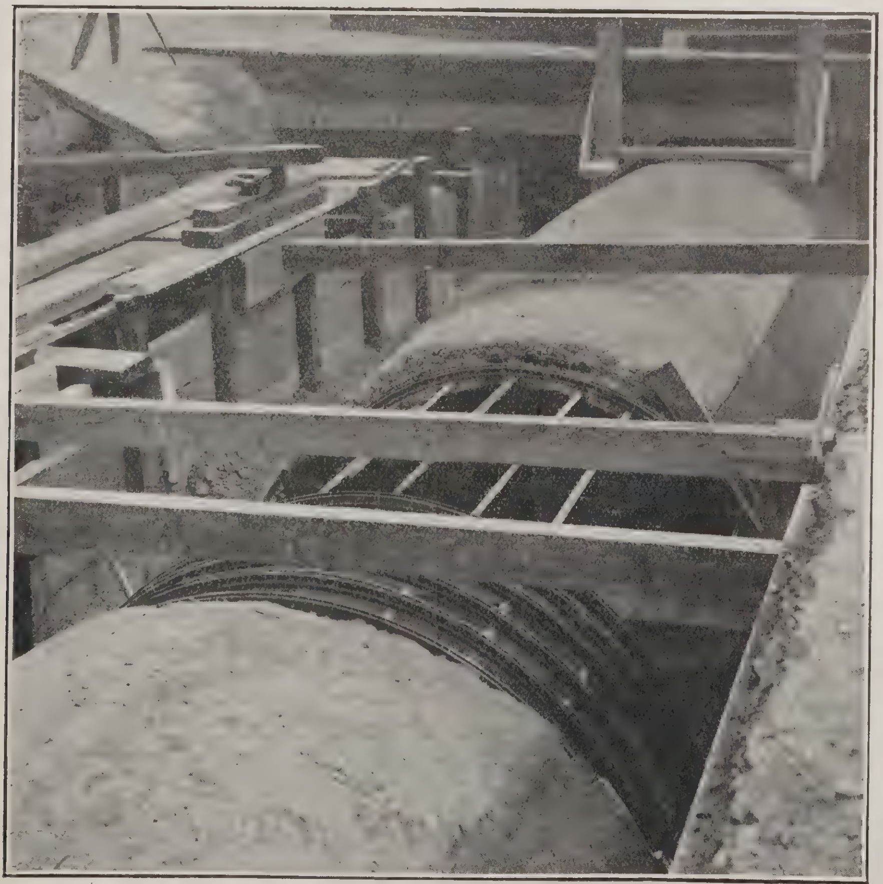


ACTON SEWER: REINFORCEMENT AT A BEND.

bars, the concrete at the crown being 4ins. thick.

The manholes, bends, house connections, &c., are all in reinforced concrete, making the whole structure monolithic.

Fig. 1 shows the reinforcement of the sewer placed in position in the excavation, the bottom bars and the curved top bars being clearly shown. Fig. 2 shows the reinforcement at a bend in the sewer, with the steel sheets forming part of the centering in position. Fig. 3 shows the concreting of portion of sewer completed.



ACTON SEWER: IN COURSE OF CONSTRUCTION.

A TEST ON A REINFORCED CONCRETE FLOOR.

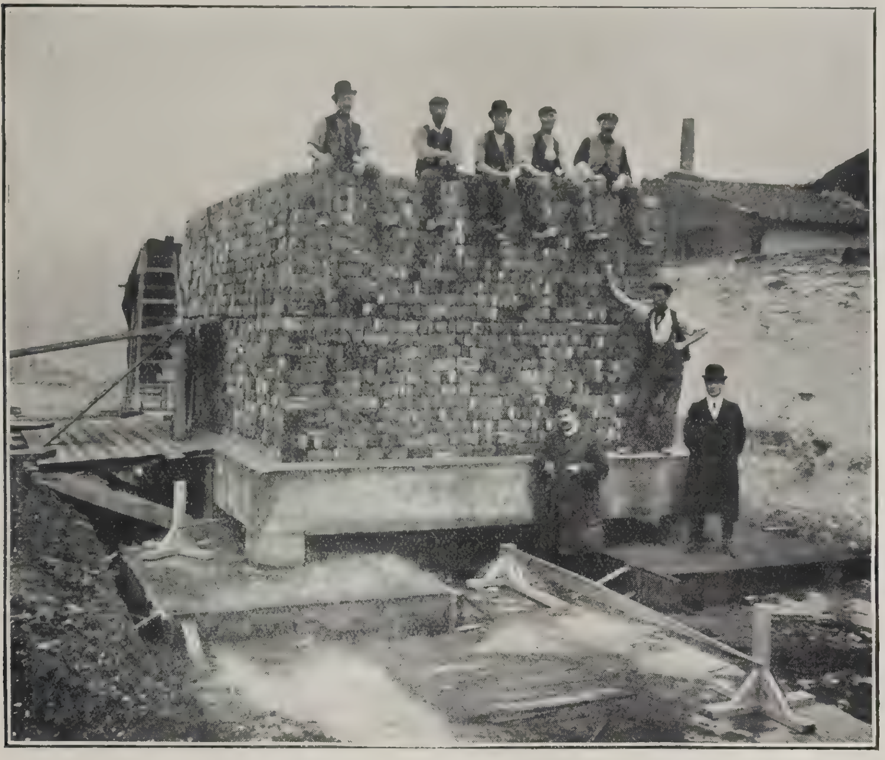
An interesting and highly satisfactory loading test was carried out, on a vacant site in Walworth, on Tuesday, May 14th, for the purpose of proving to the satisfaction of Mr. Arthur C. Blomfield, M.A., F.R.I.B.A., architect to the Governors of the Bank of England, the efficiency of reinforced concrete floors constructed on the Kahn system. The test was conducted in the presence of Messrs. William Dunn, F.R.I.B.A.; J. Rutherford, architect, H.M. Office of Works; P. H. Johnson, A.M.I.C.E., of the Midland Railway; C. J. South, A.M.I.C.E., of the Great Western Railway; Benjamin Hannen; and representatives of Messrs. Heenan & Froude and the Associated Portland Cement Manufacturers, in addition to Mr. Blomfield and ourselves.

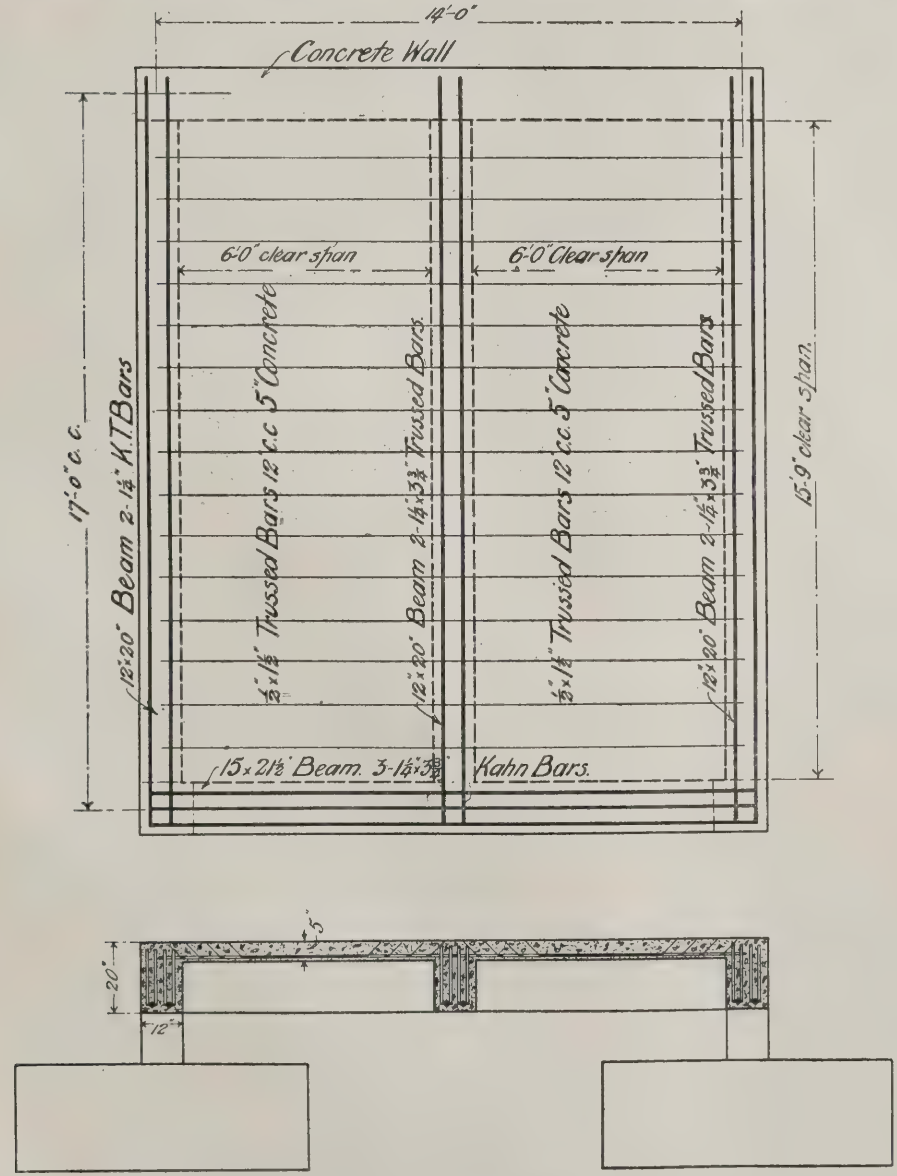
The test floor was constructed in accordance with the working drawing reproduced on the next page. It will be seen that the floor slab was supported by main beams and a wall, and in the centre by a subsidiary beam 15ft. 9ins. span, 12ins. wide by 20ins. deep, reinforced with two $1\frac{1}{4}$-in. Kahn trussed bars. It was this subsidiary beam which was really under test, and its allowable deflection was specified not to exceed $\frac{1}{600}$th of the span—i.e., $\frac{1}{600} \times 189 = \frac{1}{3}$in., with a load of 450lbs. per ft. super. The decking slab was 5ins. thick, reinforced with $\frac{1}{2}$in. Kahn trussed bars spaced 12ins. centre to centre.

As regards the materials used, the aggregates consisted of crushed Thames ballast and sand, while the cement was "Ferrocrete." Two parts of the ballast were mixed with one of sand and five parts of the final mixture were mixed with one of cement, so that the proportions of the concrete were $3\frac{1}{3}$ ballast, $1\frac{2}{3}$ sand to 1 of cement. The age of the floor at the time of the test was 67 days. The reinforcement throughout consisted of Kahn trussed bars.

The load was applied by means of bricks piled upon an area measuring 15ft. 9ins. by 13ft. $= 204\frac{3}{4}$ sq. ft. The deflection was taken at two points—namely, one at the centre of the subsidiary beam in the centre of the floor slab, and the other at the centre of the end main beam. These two deflectometers consisted of levers which, in recording, multiplied by ten the actual deflections of the beams. The deflection of the subsidiary beam was obtained by deducting from that registered by its deflectometer the amount of the deflection shown by the deflectometer under the main beam. The arrangement of the test and the position of the deflection-registering instruments are shown in the general photographic view on the next page.

The slab was first loaded with 300lbs. per square foot, for which it was designed. This load produced practically no deflection in the secondary beam. Eventually a load of 125,290lbs. was evenly distributed over the area, giving a load of 612lbs. per foot super. The deflection was ascertained to be $\frac{1}{8}$in. As the clear span of the beam was 15ft. 9ins. $=$ 189ins., the deflection was therefore $\frac{1}{8} \times \frac{1}{189} = \frac{1}{1512}$th part of the span. As stated above, the allowable deflection under a load of 450lbs. per foot super was $\frac{1}{600}$th of the span, so that the floor made a good showing.




14'-0"
Concrete Wall
17'-0" c. c.
15'-9" clear span.
6'-0" clear span
6'-0" Clear span
12"×20" Beam 2-1¼" K.T. Bars
½"×1½" Trussed Bars 12" c.c 5" Concrete
12"×20" Beam 2-1¼"×3¾" Trussed Bars.
½"×1½" Trussed Bars 12 c.c. 5" Concrete
12"×20" Beam 2-1¼"×3¾" Trussed Bars
15×21½" Beam. 3-1¼"×3¾"
Kahn Bars.
5"
20"
12"

Constructional Details.

TEST ON A FLOOR CONSTRUCTED ON THE KAHN SYSTEM FOR ARTHUR C. BLOMFIELD, F.R.I.B.A., ARCHITECT TO THE GOVERNORS OF THE BANK OF ENGLAND.

Views and Reviews.

Two Books on Reinforced Concrete.

The graphical handbook intended for designers of reinforced concrete construction drawn up by Mr. John Hawkesworth, who is the engineer associated with Mr. Raymond F. Almirall, an architect in the United States, belongs to a class of textbook with which we are not very much familiar in this country. It consists of a series of plates showing graphically by means of plotted curves the requisite details for slabs, beams and columns under various conditions of loading, and having various proportions. These diagrams enable the dimensions of structural members to be determined, or the strength of already designed members to be checked, easily and rapidly. Naturally, there are deficiencies in respect to pliability with such a series of diagrams, but anyone who becomes familiar with the use of such diagrams will find that easy means can be found for making allowances for differences in the fundamental constants adopted. At the end of the work an appendix gives the formula by which the diagrams have been drawn up, and the information enables one to readily find such necessary allowances. The tables have been drawn up to be practically in conformity with the requirements of the New York Building Code in regard to reinforced cencrete, and Mr. Hawkesworth's formulas are generally based upon rational formulæ such as have been recorded by Mr. Charles F. Marsh. Of course, such a book as this should only be used by architects and engineers who have made a thorough study of the theory of the subject in ordinary text-books. That is to say, the book should be in the hands of experienced designers; otherwise, errors might easily be made, although the author does his best to guard against them. The book is very well produced, but we would raise one or two slight objections. Firstly, there should be headings, giving a clue to what the plates consist of, upon the plates and upon the descriptions relating thereto. This would render reference slightly quicker. Although there is a plate giving the shear resistance of concrete and steel, formulæ for the determination of shear stresses in beams are not given in the appendix. As the matter is very important this deficiency should be repaired. The book is a valuable one to those specially interested in the subject.

A revised edition of Mr. Twelvetrees' well-known book on reinforced concrete has just been published. It is a small book, the information being short and to the point, and it would be well for anyone studying the subject to possess it. There are various points in which we think the book might be improved. For instance, the notation adopted is not particularly obvious on the face, and it shows the desirability of some standard set of symbols. Every author of works on reinforced concrete seems determined to adopt his own notation, but there is some sort of agreement in American works which it would be better, in our opinion, if Mr. Twelvetrees followed. It is really worrying for anyone frequently referring to several books to find a new notation every time, and especially so when it is one that is not at all simple or obvious, such as Mr. Twelvetrees'. However, the demonstration of the means of determining the stresses is most important. Although the author's demonstration of the subject is reliable as a rule, it is not always very clear. His style is somewhat difficult to readily follow, and, considering the subject is difficult enough in itself for a student's comprehension, any awkwardness in diction is much to be deplored. Among the theoretical questions discussed, a fair amount of attention is paid to the determination of shear stresses in beams, but the discussion might have been extended with advantage. Mr. Twelvetrees' demonstration is rather disjointed, and we fear will not be particularly clear to the majority of his readers. The book does not deal with the many specialist systems. It endeavours to treat the subject in a general way without regard to any particular system, although a preference seems to be exercised by the author in regard to one particular Continental system. Although the elimination of descriptions of the systems is undoubtedly an advantage in economising space and at the same time not overloading the student with unnecessary details in a preliminary treatment of the subject, we feel that this neglect has resulted in the author failing to appreciate the importance of certain practical principles which influence the design, and, indeed, to ignore certain theoretical principles which are nevertheless true and important, though they have been chiefly demonstrated by a few specialist firms. To an extent the book errs rather in being too theoretical for the elementary student and in not being quite thorough enough for the advanced student, but if not quite all we could wish, it nevertheless contains a great deal of valuable information which everyone interested in the subject should put himself in possession.

"A Graphical Handbook of Reinforced Concrete Design," by John Hawkesworth, C.E. London: Crosby, Lockwood & Son, 7, Stationers' Hall Court, Ludgate Hill. New York: D. Van Nostrand Company. Price 12s. nett.

"Concrete-Steel," by W. Noble Twelvetrees. London: Whittaker & Co., 2, White Hart Street, Paternoster Square.

REINFORCED CONCRETE SYSTEMS.

XIV.—The National Fireproofing Co.'s Systems.

The largest firm engaged in fire-resisting construction in the United States is the National Fireproofing Company. Its chief office is situated at Pittsburg, but there are other important offices at New York, Chicago, Philadelphia, Cincinatti, Boston, St. Louis, Washington, Minneapolis, Los Angeles. Not quite two years ago the firm opened a London office, since which time it has made considerable progress in this country, although it has found that the English market for fire-resisting construction is very different from that in the States, and it has had to adapt itself to meet English requirements. For instance, in the States the name of the National Fireproofing Company is chiefly allied with hollow terra-cotta floors and partitions, or, as it is termed in the States, tile construction. In England, however, steel-frame buildings are only just being adopted, and the advantages offered by tile construction have not yet been grasped by the architectural profession, for the older customary forms of construction do not serve to shew its good points to best advantage. The National Fireproofing Company has comparatively recently introduced in the States several combination systems of tile and concrete, and it seems to be gradually convincing the English architects of the advantages of such combination construction, but it adapts itself to circumstances, and is ready to meet the desires of architects, so it has carried out several jobs in reinforced concrete alone, without any tile in combination.

A Large Organisation.

The National Fireproofing Company is an enormous organisation. The company was first formed in 1889, ten years later it was enlarged, and in 1902 its capital was again increased for the purpose of acquiring additional plants and the properties of different companies. At the present time the capital amounts to 12,500,000 dollars, and the company operates at least 30 plants in different parts of the country. The company is doing an enormous business in the United States, not only in fire-resisting construction, but in the manufacture of vitrified conduits for electrical purposes, which it ships all over the world.

Hard and Porous Hollow Tile.

The company began work when steel-frame construction was almost in its infancy, and it has kept astride with the great advances that have taken place. The hollow terra-cotta floor construction which was used in the larger number of skyscrapers in the States, and, for the matter of that, smaller buildings on steel-frame principle, was what is called "hard tile"—namely, a clay of dense structure. The experience in numerous great fires demonstrated some few years ago that hard tile was not the best material for fire resistance because its expansion under heat was considerable, and because it shattered upon the application of water when heated. The National Fireproofing Company, however, found that by mixing the clay with sawdust, which burnt away in the baking, a material could be produced which did not expand under heat and did not shatter or crack when water was played on it, even if in a white-hot condition. A fire test was carried out about a year ago by the British Fire Prevention Committee on a floor and a partition of porous terra-cotta manufactured by the National Fireproofing Company. In both cases high temperatures were continued for a long time, and remarkably successful results were obtained, which we need not give again, as we have already referred to them in our Fire Supplement and the matter is no doubt fresh in the minds of our readers. Porous tile has already been subjected to the tests of actual fire in several buildings in the United States, and all doubts in connection with its efficiency have now been set at rest.

Care Needed with Reinforced Concrete.

Hollow porous tile, with which the National Fireproofing Company, as we have said, is chiefly associated, has been shown to be the most fire-resisting material on the market, because it can be subjected many times to the highest temperatures for long periods of time without suffering any appreciable depreciation. Concrete, under the same conditions, will be perished for the thickness of an inch or two from the surface exposed to the fire, and, undoubtedly, in many cases, reinforced concrete floors would need rebuilding, or at any rate very expensive repairs after fires had occurred. Everyone must now admit the truth of this, although the National Fireproofing Company was at one time almost alone in opposition to the statements of interested parties that concrete had no defects whatever. Of course, it was an interested party, but time has shown that many of its statements were undoubtedly warranted by facts. Want of care in reinforced concrete construction has resulted in serious mishaps in the United States and abroad.

Protection Against Fire.

Figure 1 shews means which the National Fireproofing Company have suggested for protecting the surface of the concrete against deterioration by fire. Of course, the advisability of employing such very adequate means is a question of cost. Circumstances may warrant the adoption of something of the kind. Reinforced concrete pillars, in particular, would be improved by such protection. A test carried out recently in the States at the instigation of the National Fireproofing Company showed that columns lost over 70 per cent. of their strength after heating for 3 hours. Furthermore, several official tests that have been carried out in the States have shewn similar results, while tests in England on reinforced con-

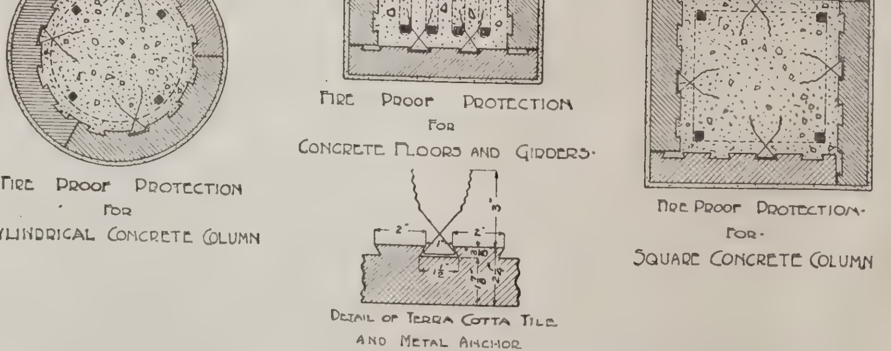
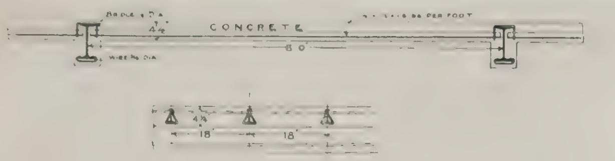
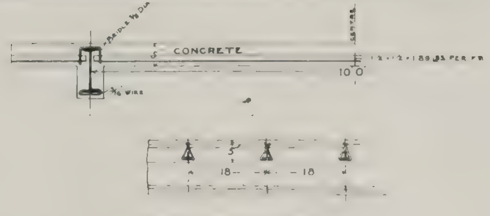

Cement Floor Finish
Concrete Slab
Tension Rod
Porous Terra Cotta Tile
Plaster Line
Plaster Line
Fire Proof Protection for Concrete Floors and Girders.
Fire Proof Protection for Cylindrical Concrete Column
Fire Proof Protection for Square Concrete Column
2"
2"
3"
1½"
Detail of Terra Cotta Tile and Metal Anchor

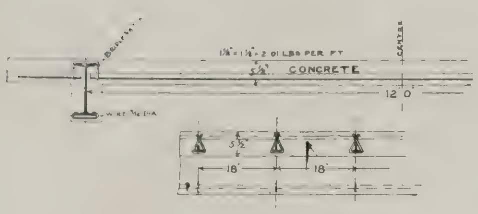
FIG. 1. MEANS FOR PROTECTING REINFORCED CONCRETE AGAINST FIRE.



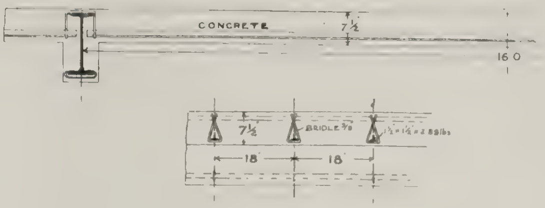
Details for 8ft. Spans



Details for 10ft. Spans.



Details for 12ft. Spans.



Details for 16ft. Spans.

FIG. 2. CONCRETE FLOOR CONSTRUCTION WITH ⊥ BAR REINFORCEMENTS SUSPENDED IN BRIDLES.

crete floors have shown, too, that water from the hose removes the concrete from the underside of the reinforcements. We can legitimately draw from such facts the conclusion that the effect of heat is much greater in the case of a post exposed on all sides than a floor slab exposed to heat on only one side, or even a beam exposed on three sides. The importance of the matter is obvious because the whole stability of the structure depends upon such supports, which, as we have seen, are most exposed to the effects of fire.

The National Fireproofing Company also pointed out the necessity for the greatest care in the workmanship in reinforced concrete construction, in view of the many chances of error. Want of care has resulted since its warning in serious mishaps in the United States and abroad.

Adequate supervision will provide suitable safeguard against this danger, and the National Fireproofing Company would not press the point as an objection too far, because it is prepared to execute reinforced concrete construction, and, as a matter of fact, has done a good deal in this way.

A Solid Reinforced Concrete Floor.

Figure 2, for instance, shows the form of floor construction which is now being used at the Birmingham Telephone Exchange and at Orleans House, Liverpool. It will be seen from the diagram that the reinforcement consists of ⊥ bars of various sizes and weights according to the spans. These tees are suspended in bridle supports made of steel wire placed over the main beams, which are of steel.

Such construction is simple, and in somewhat similar forms has been used extensively in this country, the United States, and elsewhere, especially in connection with steel-frame buildings. The centering for such floors can be suspended from the steel beams, and there is no need to encumber the floor area below by props.

A Tubular Concrete Floor with Steel Beams.

Figures 3 and 4 show two other forms of floor construction which have been used at the Manchester Infirmary, the former more extensively than the latter. Of the construction shown in figure 3, about 40,000 yards have been built. The construction consists of hollow concrete tubes, 4ft. 6ins. span, between and resting on steel joists. These tubes are placed side by side, and upon the top is placed a filling of concrete to bring the surface of the floor level with the joists. The total thickness of the floors varies, according to the spans, from 8ins. to 16ins., the tubes being made open or flat according to the depths of joists. The bottom crust, which is 2ins. thick, is reinforced with two $\frac{3}{16}$ in diameter rods. The bottom flange of the steel joist is protected by a terra-cotta soffit tile resting on the lip of the tube. This tile being of porous structure, provides particularly good protection to the bottom flange of the steel joist for the above-mentioned reason. Such a type of floor construction is cheap, speedy of erection, and most advantageous where deep joists are used and a level ceiling is required. It is superior to the ordinary solid concrete floor in that it is sound-proof, whereas a solid floor conducts sound readily, whilst it will be observed it offers little chance of error in workmanship. A tube floor is also about one-third the weight of a solid floor, and thus saves steel. The tubes are made by casting in moulds, being removed after 20 minutes. The proportions of the concrete generally adopted are one part Portland cement to four parts of pan breeze, the filling being five to one. No patents are claimed in this construction.

A Tubular Floor Without Beams.

Figure 4 shows the second system of floor construction that has been used for the corridors at the Manchester Infirmary. Tubes, 3ft. 6ins. span, are also used here, but the beams are reinforced concrete ones, two tees being used as shown. The span does not there exceed 10ft. The tubes are supported on light centering, the filling over the tube and for the beam being all one, so as to form a monolithic structure that has at the same time considerably greater sound-resistance than a solid floor. The National Fireproofing Company has also used at the Manchester Infirmary round rod reinforcements for beams and floor panels constructed *in situ* upon a more complicated centering. In the States three forms of combination-construction of tile and reinforced concrete are in favour, varying according to location. In New York, for instance, the Bevier floor is generally favoured, while in Chicago the Johnson system holds chief sway. Both these constructions are particularly applicable to steel-frame buildings.

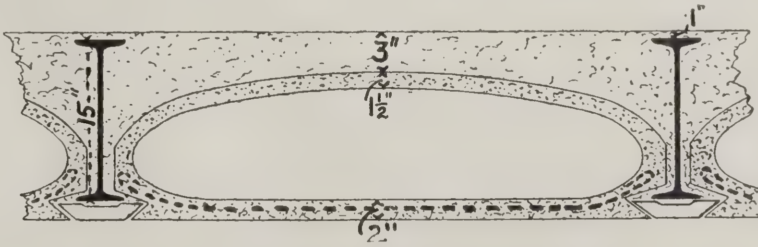


FIG. 3. DETAILS OF TUBE FLOOR CONSTRUCTION.

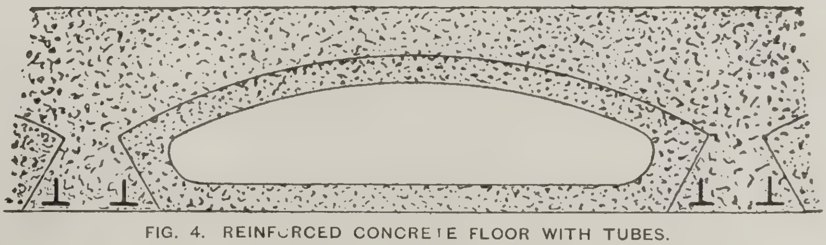


FIG. 4. REINFORCED CONCRETE FLOOR WITH TUBES.

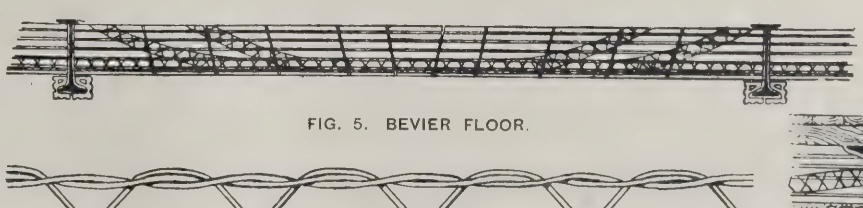


FIG. 5. BEVIER FLOOR.

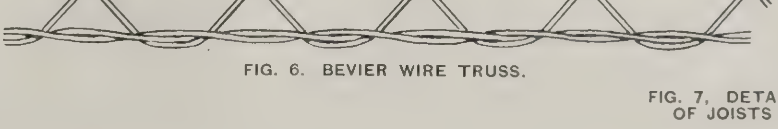


FIG. 6. BEVIER WIRE TRUSS.

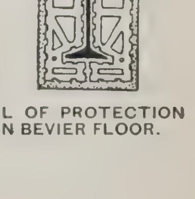


FIG. 7, DETAIL OF PROTECTION OF JOISTS IN BEVIER FLOOR.

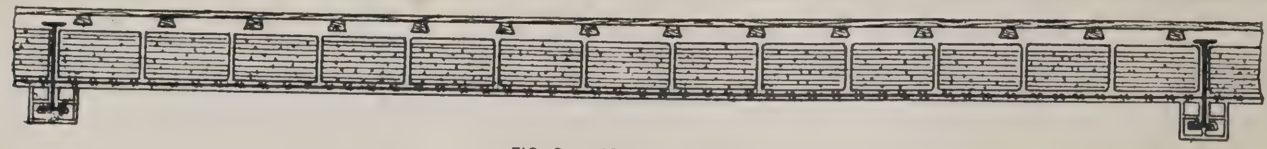


FIG. 8. JOHNSON FLOOR.

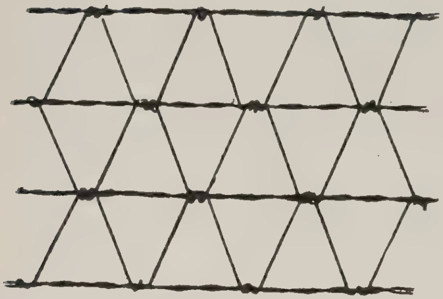


FIG. 10. JOHNSON MESH REINFORCEMENT.

The third form of floor is as illustrated in Fig. 11.

Bevier Floor.

The Bevier patent floor is somewhat similar to the old flat-arch floor of which so many acres have been constructed in the sky-scrapers of the States, but it can be built of wider spans than the flat-arch floor owing to the steel reinforcement, which consists of a wire truss as shown in Fig 6. This reinforcement is made 1in., 2ins., 3ins. and 4ins. wide, the four longitudinal wires bein $\frac{1}{8}$in. diameter and the two diagonal trussed wire being $\frac{1}{16}$in. diameter. For short spans and light loads one length of Bevier truss between each row of hollow porous terra-cotta blocks is sufficient reinforcement, but for wider spans and heavier loads further reinforcement is required, and then, in such cases, several lengths of wire-truss are placed side by side, the ends of one or more being inclined upwards as the supports are approached (where less material is required in tension by reason of the reduced bending moment), in order to resist shear stresses. Such a form is shown in Fig. 5. A floor of this character is sound-proof, light and economical in construction, as it can be rapidly executed, as the centering required is very light and can be removed as soon as the key of the arch is in place. Upon the terra-cotta blocks a layer of concrete may be placed, and in wide spans is necessary to resist the compressive stresses. It was a floor of Bevier construction that was tested so successfully by the British Fire Prevention Committee and referred to above.

The Bevier truss, it may here be mentioned, is also used for the reinforcement of partitions formed of hollow porous tile blocks, the truss being run through each horizontal joint of the partition.

The application of this system to the construction of roofs is fairly obvious, the terra-cotta blocks with Bevier truss reinforcement being placed between the steel rafters or steel purlins as desirable. It can also be applied to the construction of staircases.

Johnson Floor.

The system invented by Mr. E. V. Johnson, illustrated in Figs. 8 and 9, consists of a mesh-work placed between girders embedded in cement mortar, upon which are placed terra-cotta blocks without a final layer of concrete. The mesh-work is illustrated in Fig. 10. Each longitudinal strand consists of two twisted wires, while the diagonal strands are smaller section wires. Such floors can be constructed for heavy loads and have successfully undergone fire tests.

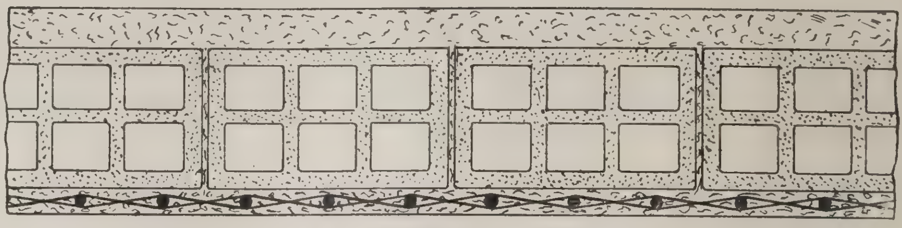


FIG. 9. DETAIL OF REINFORCEMENT AND TUBES IN JOHNSON FLOOR.

In both the Bevier and the Johnson floors the reinforcements are made of galvanised drawn wire. The galvanising is perhaps an additional security, although it is a proved fact that concrete or cement mortar adequately protects steel against corrosion. The steel being drawn through the die has a high elastic limit as well as a high ultimate strength, and we have before referred in our columns to the economy of metal which this offers.

A Combination Tile System.

Fig. 11 illustrates the construction of a floor used in the Marlborough-Blenheim Hotel, Atlantic City, a well-known building, which is often referred to as a thoroughly logical architectural development of reinforced concrete construction. This hotel was built at a wonderful speed by the National Fireproofing Company in conjunction with the Trussed Concrete Steel Company, the reinforcements used being Kahn bars. This form of construction is greatly favoured at the present moment in the United States. It offers obvious advantages in the way of soundproofness and lightness, while it also is free from any trouble of condensation which sometimes forms on concrete in humid atmospheres.

In both the Bevier floor and this third type of floor the replacing of the concrete below by hollow tiles loses none of the strength, because concrete below the neutral axis cannot be depended upon to add anything to the strength of a floor. The construction in the latter is really a kind of T-beam or rib construction in which concrete assists in the resistance of shear stresses, whereas in the former the shear stresses have to be resisted by the metal shear members alone.

The construction illustrated in Fig. 11 has been used a good deal for roofing purposes. There is no necessity to use the double centering to retain the concrete, the tile breaking up the concrete and doing away with its tendency to slide down. The concrete is filled in between the hollow terra-cotta blocks, and finally, if necessary, carried over the top.

Contracts.

The National Fireproofing Company carries out work itself on any of these systems, and is prepared to execute work on almost any system of reinforced concrete or terra-cotta construction. It is prepared to adapt itself to any circumstances and to meet the wishes of architects who favour any particular kind of system of construction.

Although the firm has been established for such a short time it has executed a considerable number of contracts, many of them naturally small, and not of sufficient interest to record in these columns. Among the larger buildings, however, which are still in hand we may mention the following:—Manchester New Royal Infirmary (Messrs. Edwin T. Hall and John Brooke, architects); Orleans House, Liverpool (Messrs. Matear and Simon, architects); Birmingham Telephone Exchange (Mr. Leonard Stokes, architect); Manchester County Bank, Bolton (Messrs. Mills and Murgatroyd, architects).

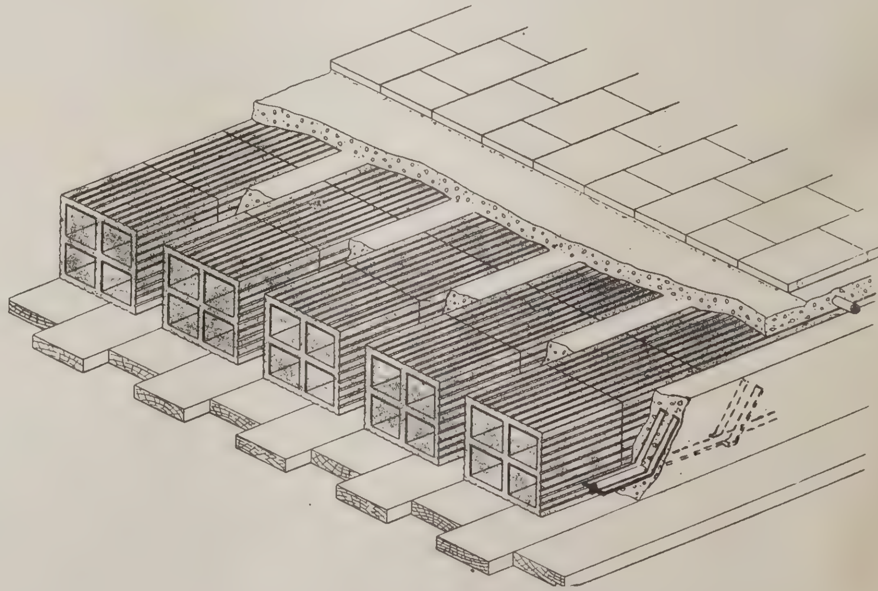


FIG. 11. HOLLOW TILE AND REINFORCED CONCRETE FLOOR.

THE BUILDERS' JOURNAL
AND ARCHITECTURAL ENGINEER.
June 19, 1907.
CONCRETE AND STEEL SUPPLEMENT (MONTHLY).
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SPIRALLY REINFORCED CONCRETE AND ITS APPLICATION.

By A. Considere, Inspecteur-Général des Ponts et Chausees (retired).

(Concluded from p. 55.)

Chapter V.—Various Advantages of "béton fretté" according to its Applications.

The advantages obtained by the employment of "béton fretté" are very different according to the applications which are made of it, as we see by the following:—

Independent Beams.

In these beams it is the flange of large section which supports the pressures forming one of the components of the couple of flexure. The stress per unit which is developed can generally be maintained within the limits authorised for armoured concrete, so that it is not necessary to employ a spiral reinforcement.

It is quite different with beams of a rectangular section and without flanges, where spiral reinforcements are advantageously employed.

Hinged or Normally Built-in Posts.

In these pieces, if such could exist, the ductility of the concrete does not present any interest, and the inferiority of its elasticity will impose, from the point of view of rupture by bending, some limits of loads which have been recorded in rate per cent. of the resistance of concrete not reinforced (see paragraph on the "Limits of Forces" on p. 54).

In spite of these limits, "béton fretté" has an important advantage over armoured concrete in posts having the ratio of length to diameter of 20, which is very rarely exceeded in constructions.

In deducting from the loads really supported by the posts of ratio of length to diameter 20 (Nos. 9, 10, 28, 30, 31 of table No. 11) the loads supported by their plain concrete counterparts, we obtain the total resistance produced by the reinforcements. One finds, in doing so, the figures 8400 and 22,100 kilograms, average 15,250, for the armoured posts, and 35,700, 39,700, and 41,900, average 39,100 kilograms for the spirally reinforced posts. The difference is still greater from the point of view of its regularity than from that of its average value.

The advantage of "béton fretté" is very great again for these posts, and will still remain, although less, for posts of greater ratio of length to diameter.

Hinged Arches.

The superiority of the resistance is much more important in these arches when their span and their flatness are greater, and when, therefore, their own weight is more important by comparison with the other loads and superimposed loads.

Besides, the test of the bow-string bridge of Ivry has proved that "béton fretté" allows the employment of lattice in consequence of its resistance to the transverse shearing. It lends itself therefore to certain combinations for which ordinary armoured concrete could scarcely be considered.

Posts in Buildings.

It has been shown in paragraph 27 that posts in buildings are neither jointed nor normally built-in, and that the ductility of "béton fretté" adds its advantages to those of greater resistance. There is no need to return to these points.

Continuous Beams.

The formulæ of elastic continuous beams are well known. In the simple case of equal spans and of infinite number which we could choose for exactitude, the bending moments over the supports are twice as great as the moments at the middle of the spans when the load is uniformly distributed, as in reservoirs, retaining walls, terraces and roofs.

When the distribution of the superimposed load is variable the difference of the very maximum on the supports and at the centre of the spans (or bays) is less, but still very important.

In beams of reinforced concrete the difference is still greater than in beams perfectly elastic, as has been proved by an experiment made on a beam of several spans of 12 metres in length, which would be too long to describe and discuss here. It is easy to understand the cause.

In the beams formed of ribbed slabs the neutral axis is situated much above the centre of the depth. Therefore for some curvatures, uniform or very nearly so, the limit of elasticity of the concrete in tension is exceeded much sooner in the ribs at centre of spans than in the flanges over the supports, and this a long time before the working load is reached.

Regarding the concrete in compression, its limit of elasticity is nowhere reached.

It results from this that if the beam had, under a small load, moments of inertia equal throughout its length, that uniformity would soon disappear. The moments of inertia at the centre of the span diminish rapidly while those over the supports remain for a long time constant.

But we know that in continuous beams the variations of the moments of inertia produce variations of the same sense in the bending moments, and we understand therefore that the bending moments over the supports are relatively still greater in reinforced concrete beams than in beams perfectly elastic, for which the classical formulæ have been established.

The results of experiments and theoretical considerations lead us, then, to reinforce the beams more strongly over the points of support than at others, but we encounter a great difficulty if we employ the ordinary types of reinforcement.

While in the centre of the spans the pressures are distributed on the large section of the flanges, it is quite different over the supports where they are supported only by the rib, of which the section is relatively small. If we make some practical calculations it results that for beams truly continuous which have dimensions and percentages conforming to custom, the concrete of the ribs, assumed to be without any lower reinforcement, will support pressures near to 90 to 100 kilogrammes per square centimetre. This more than doubles the stress which could be permitted.

It is true that lower reinforcements are always employed over the supports to reinforce the concrete, but these are badly used for the following reason:—

The pressure of the concrete must not exceed 45 kilogrammes, and the modulus of elasticity has an average value of 2×10^9. The shortening of the fibres on the underside does not, then, exceed 0·23 millimetres per metre.

The lower reinforcements being nearer to the neutral axis than the extreme fibres, their shortening is at most 0.18 millimetres, and therefore the resistance supplied by the metal is nearly 4 kilogrammes per square millimetre. This is one-third of the stress which could be put on the metal if it were not associated with the concrete which crushes prematurely.

The difficulty is again increased by the fact that in increasing the section of the lower longitudinal bars one increases the moment of inertia of the beam over the support, and therefore the bending moment which would be developed.

To these observations it is important to add a remark of a practical nature.

The lower reinforcements cannot be stopped towards the middle of the span where they carry alone the tension stresses. Their ends are, then, generally placed too near the supports to allow the adherence permitted to these bars to produce its full effect. Besides, it is to be feared that the ends of the bars produce on the concrete some lateral thrusts which the transverse stirrups, already fatigued near the supports by the shearing stress, support with difficulty.

After that study one might ask how the beams of continuous floors generally work when their upper and lower reinforcements are extended very little beyond the supports, and have not sections in proportion to the bending moments, which are foreseen by the preceding considerations.

In the floors lightly loaded it often happens that no external sign instructs us with regard to this subject, but in those which are heavily loaded one frequently notices, following the lines of support, cracks which give evidence of either the excessive fatigue of the reinforcements or their slipping in the concrete. These cracks sometimes penetrate vertically in the posts that the beams support.

The endeavour is sometimes made to prevent these defects, which are more or less serious, according to the case, by increasing the depth or the width of the ribs of the beams over the supports, but no good results from doing so, because all increase of the moment of inertia of the beams over the supports increases the bending moments at the same time as the resistance. These dispositions only produce a small part of the effect which is expected.

The best solution of the question of continuous beams appears, then, to consist of the use of "béton fretté," which, with the usual percentage, can support pressures of 96 kilogrammes, and which it can do more easily than armoured concrete.

In short, the concrete which sustains these high pressures is shortened by 0·50 millimetres. The longitudinal bars which it contains are shortened by 0·40 millimetres, and produce resistances of nearly 9 kilogrammes per square millimetre. This is more than double the efficiency of the compressed reinforcements in the beams not spirally reinforced.

Besides, these bars being contained in the spirally reinforced core, the lateral thrusts which their extremities might produce will not present any danger.

The preceding considerations establish the superiority of " béton fretté " in continuous beams which work normally. The advantages which it presents would be much greater still in the case where the unequal subsidence of the supports would impose some unforeseen stresses. The examination of Fig. 5 and the first paragraph of Chapter III. (p. 44) show that a subsidence of the supports as great as it would be possible to obtain would not endanger spirally reinforced beams.

Built-in and Continuous Arches.

As regards the action of the loads, we can only repeat for continuous arches that which has been said of hinged arches. The question is very different for the lineal variations—that is to say, for the changes of dimensions which the following causes impose on the concrete.

During its setting and its hardening concrete kept in air undergoes a contraction which varies from 0·0003 to 0·0004. One part of this shortening is produced in the arches towards the centre before the keystone is put in, and it is not possible to take that into account in calculations.

The variations of temperature impose on the concrete lineal changes of dimensions which are comprised within the limits 0·00015 and 0·00020, above and below the average.

The compression of the arches resulting from the thrust produces shortenings of 0·00015 to 0·00025.

Finally the materials of the abutments do not escape the general laws of elasticity, and yield to the thrust in receding the more as the molecular forces are greater. The resultant pushing out of the piles or abutments adds its effects to those of the contraction due to reduction of temperature and of the shortening of the arch under pressure. It is necessary to determine the influence which these various causes exercise on the molecular forces in continuous arches.

Monsieur Résal, in his treatise on metallic bridges (" Ponts Metalliques "), gives the following expression for the thrust Q, which produces a lineal variation t in a parabolic arch, of which we designate by f the rise, r the radius of gyration of the transverse section, I the corresponding moment of inertia, and E the modulus of elasticity :—

$$Q = \frac{EIt}{\frac{4}{45} f^2 - I^2}$$

For simplification one can neglect without great error, r^2 for the sake of f^2, which is much greater.

The thrust produced by the lineal variations crossing the rise at two-thirds of its height we obtain for the value of the bending moment at the springings

$$M = \frac{22\ EIt}{3f}$$

In combining this formula with the expression for the force (tension or compression) n, that the moment M produces in a fibre situated at a distance v from the centre of gravity of the section, which is

$n\frac{Mv}{I}$, one obtains finally, $n=\frac{22Evt}{3f}$

the outer fibres of the concrete, is therefore independent of the metallic armatures which it contains. This result, surprising at first glance, can perhaps be understood without the aid of any formula. In short, if one takes two arches having the same dimensions, and constructed one of concrete and the other of metal, it is easy to prove, and one perceives, that a similar lineal variation will produce identical deformations of the middle fibre. It therefore follows that if they are placed in lateral juxtaposition they will produce no reaction the one on the other, and will behave as if they were independent.

One can consider armatures uniformly distributed in the section of a concrete arch as equivalent to a section of a metallic arch contained by two vertical planes parallel to that which contains its neutral fibre, and it is evident that in the deformation produced by the lineal variations these armatures ought not to react more on the concrete than it would on an entire metallic arch.

The metallic armatures could only exercise a certain action upon the fatigue of the concrete if, distributed in such a manner as to displace the centre of gravity of the section, they might cause its distance v from the outer fibres to vary.

To summarise the results of this formula one can attribute to t the total value 0·0005, replace E by $1{\cdot}5 \times 10^9$, and give to v/f the value 1/10, which is found in certain flat arches.

The formula thereupon gives for n the value of 55 kilos. per square centimetre.

In arches flattened to 1/10 the lineal variations which one has to provide for are sufficient therefore to impose on the outer fibres of the section of the springings pressures higher than the authorised maxima in such a way that no margin remains to meet the thrust, and the bending moments produced by the unsymmetrical loads.

And this is true whatever may be the percentage of longitudinal bars embedded in the concrete of the arch.

In consequence I do not see any means of executing in concrete armoured with longitudinal bars a continuous arch flattened to 1/10 or more, *a fortiori*, of which the concrete will not support pressures much higher than the authorised maximum of 45 kilos.

In doubling at least the pressure that one can impose upon the concrete without submitting to its modulus of elasticity an equal increase, the spiral reinforcement permits the construction of continuous arches flattened to 1/10, and even flatter.

In the foregoing one has attributed to the lineal variations some values in connection with this that one ought to foresee normally, and one has admitted that the corresponding molecular forces in the concrete ought not to exceed the regulating maxima. There is the question to face, besides, of the eventuality of abnormal settlements of the supports proceeding from unforeseen causes. If these settlements were of considerable importance arches in armoured concrete would be in danger, because they would not be able to submit to considerable deformation without crushing.

To this assertion one cannot oppose the flexures, sometimes very large, which armoured beams can support. In fact, these flexures result from the lengthening of the armatures in tension beyond their limit of elasticity, which is attained before the crushing of the flanges. With arches the case is different, because the thrust greatly increases the pressures that produce the flexures and diminishes to the same extent the tensions in such a way that the concrete, armoured with longitudinal bars, would crush before the opposed armatures could have sustained the lengthenings which would permit considerable deformations of the arches.

It would be entirely different with arches formed of " béton fretté," which possesses, notably in bending, an extraordinary ductility, which has frequently been spoken of in this article.

No movement of the foundations could possibly damage the faculty which " béton fretté " possesses of deforming itself without crushing.

Chapter VI.—Applications.

" Béton fretté " has already been used in numbers of ways. Everywhere the importance of the advantages which it presents from the different points of view indicated above has been established.

Posts and Columns.

Beyond its general advantages " béton fretté " has, in posts and columns, the advantage of reducing dimensions, because it permits of increasing the unit pressures and diminishing the sections. For example, the posts of 68 by 68 centimetres loaded symmetrically, which carry 700 tons in the factory of Messrs. Ménier at Noisiel-sur-Marne, may be cited. The pressure per square centimetre reaches the exceptional figure of 150 kilos. The concrete contains 450 kilos. of cement per cubic metre, and the percentage of metal is 4 for the spirals, and 2 per cent. for the longitudinal bars. These posts were constructed with special care under continuous supervision.

When the circumstances do not require exceptional arrangements one employs lower proportions of cement and percentages of metal, and one limits the loads to figures varying between 60 and 120 kilos. per square centimetre. We will cite also the posts of the great factory constructed at Brünn, by Messrs. Ed. Ast & Co., of which a description has been published in " Béton und Eisen."

Beams.

It has been explained that if one established a real continuity in beams of several spans in heavily armouring the upper fibres above the intermediate supports, there would be produced in the lower fibres pressures which one could only permit in " béton fretté."

In the construction of the factory at Noisiel especially real continuity has been secured of a considerable number of subsidiary beams and beams strongly armoured, of which some support loads of 200 tons.

Bridges.

It was necessary to submit " béton fretté " to laboratory experiment in a work where would be united all the difficulties that one can encounter in construction.

With this object a bridge was constructed in a yard connected to the station of Ivry-Orléans, and a test to destruction was made in November, 1902. In the third volume of 1903 "The Annales des Ponts et Chaussées" give an account of the dispositions of this work and the results of the test. One can only give here a brief résumé:—

The span of the bridge was 20 metres. The two main beams spaced 2·50 metres from axis to axis were bow-strings of 2·30 metres rise.

The upper and compressed members were strongly spirally reinforced. They were generally 25 centimetres in diameter but 20 centimetres only in the central panel where it was desired to test under very heavy loads spirally reinforced concrete of great resistance.

The lower tension members were straight and connected by the decking. They had a diameter of 25 centimetres; they were reinforced with longitudinal bars and surrounded by spiral reinforcement with the object of consolidating the connections.

This construction, of which the weight was 30 tons supported 241 tons of rails. At the moment of breaking the pressure of the concrete in the spirally reinforced core was 460 kilos. in the members of 25 centimetres, and 719 kilos. in the members of 20 centimetres.

There is being executed at this moment a bridge of 44·50 metres span, which will connect the factories constructed for Messrs. Ménier on the two banks of a branch of the river Marne at Noisiel.

There is being constructed at Avranches and at Coutances two openwork viaducts for the Manche railways.

The viaduct of Avranches, of which the length is 86 metres, comprises an arch of 33·60 metres span crossing the See, a bowstring of 30·20 metres crossing over the lines of the Western Railway and straight beams of 10·40 metres span.

There is going to be constructed at Nice a bridge over the Paillon of 111 metres length formed of really continuous straight beams of 14·40 metres span.

Piles.

One knows that it is a general usage in driving armoured concrete piles to take special precautions to avoid rupture. The monkey strikes upon a dolly of wood, which is separated from the head of the pile by a bed of sand or of sawdust contained in a metal cap separated from the head of the pile.

These arrangements diminish the effect of the blow, and increase, consequently, the cost of driving; they retard the penetration and are capable of reducing the depth of driving and the final resistance. It is an affirmed fact that the sawdust or sand does not always suffice to avoid the breaking of piles in the driving.

The use of "béton fretté" does away with all these difficulties.

We would only mention the piles used, firstly, by way of experiment at Port-a-l'Anglais, then by hundreds at Vilvorde near Brussels, at Boulogne-sur-Mer, and in the Argentine Republic. We will give a few details of the 500 piles which were employed to support the factory at Noisiel.

These piles were, in general, 11·50 metres long, and of an octagonal section of 35 centimetres diameter. The concrete contained 450 kilos. of cement to 800 litres of gravel and 400 litres of sand.

The percentage of the reinforcements was in all 3.

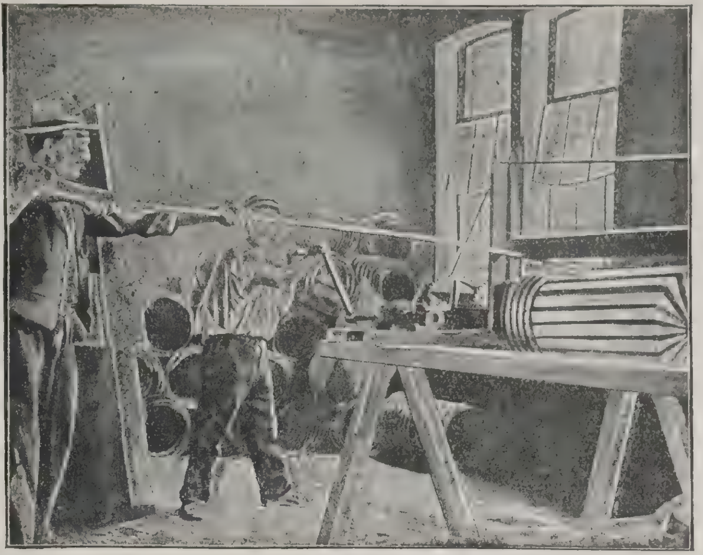


FIG. 7. MAKING SPIRALS.

After six weeks of setting in mid-winter, the first piles withstood the driving perfectly. The others were driven at a greater age. A Lacour pile-driver was employed, with a two-ton monkey at a drop of up to two metres.

The monkey struck directly upon the head of the pile without the interposition of a dolly or a cushion of sand or of sawdust.

By way of experiment a pile was constructed 17 metres long, with the same diameter of 35 centimetres. To assure to so slender a pile the necessary resistance to bending during the various manipulations and the driving, the percentage of reinforcements was increased to 4.

This pile was driven by a monkey having 2 metres drop and the driving was continued long after it had refused to penetrate any further.

Except for the splintering of the head for a distance of 8 to 20 centimetres, no damage was caused to the 500 piles driven. To ascertain that no damage existed in the pile of 17 metres the portion of about 6 metres which remained without use above the level of the foundations was cut off, and the spirals and longitudinal bars were removed, and it was proved that the concrete thus disarmoured had preserved all its cohesion.

Approximate calculations prove that the piles at Noisiel have supported pressures of more than 250 kilos. per square centimetre during the driving.

The "Deutsche Bauzeitung" has just given an account of the driving of 400 spirally reinforced piles, which were used by Messrs Wayss & Freytag in the foundations of the cover of the Doller canal at Mulhouse. As at Noisiel, no cap was used in the driving, but a wooden dolly was interposed because the piles were only six weeks old at the time of driving. The success was the same.

The remarkable resistance of spirally reinforced piles is from the point of view of foundations a fact of which it is hardly necessary to demonstrate the importance; it is desirable to bring out a more general consequence.

The laboratory tests will inform those who have had experience of them, but they have little weight upon the opinion of practical men.

On the other hand, the tests of constructions such as one generally makes prove simply, when they succeed, that under the loads imposed by the text-books no damage is produced, but they give no information upon the margin of safety—that is to say, upon the measure in which one could,

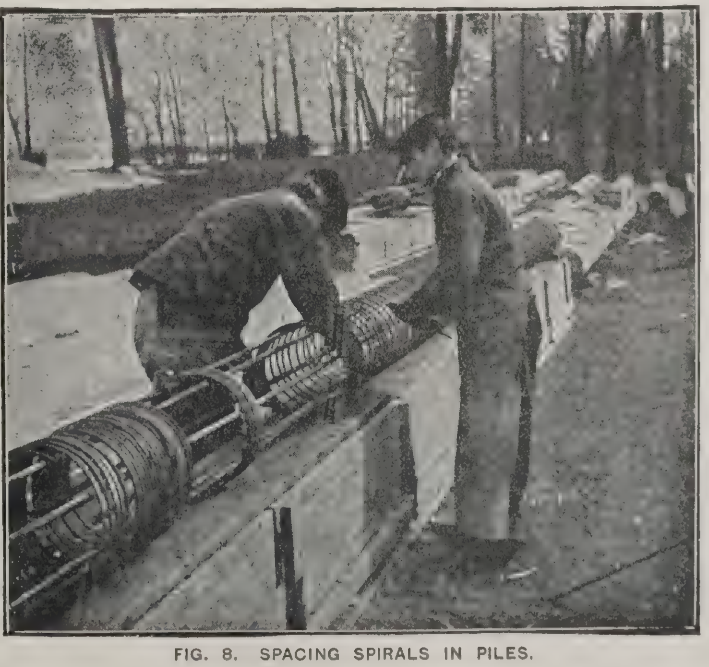


FIG. 8. SPACING SPIRALS IN PILES.

without danger, increase the load and the accessory forces.

The tests to destruction only, then, give complete information.

One understands consequently the importance of the direct driving which armoured piles cannot support, but which spirally reinforced piles with lower percentages of metal withstand with complete success.

Nett Cost.

Bars of small diameter supplied in coils of 60 metres and larger bars of 10 metres are wound directly on a reel.

A double-geared windlass, costing about 300 frs., is sufficient to wind bars up to 26 millimetres diameter. It is not probable that there will be any necessity to employ larger diameters.

For all diameters the expense at Paris for winding the spirals by hand varies from 70 centimes to 1 fr. per 100 kilos. of metal.

The armatures of the usual types bent or terminated simply by hooks or fish-tails require more handling.

The cost of laying is very small, especially if the spirals are formed of thicker bars. The more rigid they are the wider can one space the ligatures which unite them to the longitudinal armatures.

The concreting of vertical members presents no difficulty. The core which furnishes resistance to crushing is almost entirely free, and can be rammed rapidly and efficiently by means of rammers of considerable diameter. It is only between the spirals and the shuttering that one ought to employ the small rammers in use in the workshops.

The concreting of horizontal members is slower than that of the posts, but it is not much more difficult than that of beams armoured according to the common type with longitudinal bars and stirrups. Experiments have been made on a large scale in the manufacture of 900 piles constructed at Noisiel and Mulhouse with pitches of the spirals from axis to axis varying from 30 to 60 millimetres. We have shown with what severity these piles were put to the test by the direct driving without dolly or cap. One cannot wish a better control of the manufacture.

In short, the manufacture of "béton fretté" costs no more than that of armoured concrete of the usual types.

Chapter VII.—Résumé and Conclusion.

Principle of the Effects of Spiral Reinforcement.

Among the molecules of spirally reinforced bodies a phenomenon is produced analogous to friction, which gives to boxes of sand employed to carry the centering of bridges in construction their great resistance.

On the other hand, the cohesion of spirally reinforced bodies persists under pressures and in spite of deformations, of which no idea has been formed.

Conditions for a Good Spiral Reinforcement

To produce its effects the spiral reinforcement should fulfil the following conditions:—

"The spirals ought to be close together, and should form with the longitudinal bars a network sufficiently close so that the concrete cannot escape between its meshes.

"The spirally reinforced cores should be solid, or present only voids of little importance.

"The projection of the spirals on a plane perpendicular to the axis of the prisms ought to be convex."

Results.

In the posts of which the results are shown in table No. 1 the efficiency of all the embedded reinforcements has been, on the average, three times greater for those which were spirally reinforced than for those which were armoured by longitudinal bars with tie pieces.

If one distinguished the spirals one would find that their efficiency has been four or five times greater than those of the usual reinforcements.

The spirally reinforced members have given very high resistances, up to 1,800 kilos. per square centimetre of the section of the spirally reinforced core.

The shortening before rupture has varied from 20 to 120 millimetres in simple compression, and to more than 200 millimetres in flexure. We know that armoured concrete cannot support a shortening exceeding 1 millimetre and very exceptionally 1½ millimetres per metre.

Novelty of "Béton Fretté."

By its principle, its dispositions, and its results, "béton fretté" is a new material.

In the dispositions which ideas entirely strange to spiral reinforcing had led certain contractors to adopt, there were always certain essential conditions wanting. The links were much too widely spaced, or the surrounding concrete presented a considerable interior void, or else the links had rectilinear sides, which became convex under the outward thrust of the concrete.

As to the actual principle of spiral reinforcement, it seems to be established that it had never been in question before 1902, and it is a fact to note that in its instructions of 1904 the German Government wished still to ignore it, and only to attribute to transverse armatures no other service than the prevention of the individual rupture by bending of the longitudinal bars.

It is another fact that constructors had hitherto neglected the transverse armatures in the calculations of resistance and have only taken the longitudinal bars into account.

It is important to recall the experiments dealt with under the heading, "Tests on spirally reinforced cylinders without any longitudinal reinforcement," on p. 41, in which some cylinders spirally reinforced and absolutely destitute of longitudinal armatures have given resistances up to 740 kilos. per square centimetre. It is therefore impossible to consider "béton fretté" as an improvement upon concrete armoured with longitudinal bars.

Usefulness of "Béton Fretté."

In independent or hinged members the advantage of "béton fretté" results only from the superiority of its resistance.

In other members: connected posts, continuous beams and non-hinged arches, the ductility of the concrete adds its advantages to those of resistance. In the case of movements in the foundations, the ductility would have even more importance than the resistance.

Workmanship.

An examination of the figures in tables Nos. 1 and 2 proves that, in spite of bad workmanship (wilful and exceeding that which can be foreseen on the works) the resistance of "béton fretté" in pieces tested has been much more regular than that of armoured concrete and has departed much less from the results of calculation.

Warning of Danger.

The bursting of the shell of concrete covering the spirals announces danger long before it is imminent, and shows exactly the points which are endangered.

The circular form of the spirally reinforced cores would permit in case of necessity of their consolidation by a supplementary spiral reinforcement, giving a slight increase of diameter.

Factors of Safety.

From the preceding it follows that in taking the resistance as the sole basis for calculation one ought to adopt factors of safety much lower for spirally reinforced and ductile concrete than for armoured concrete, which will crack, not being able to withstand considerable deformations in compressed and short pieces. For prudence it is well to do precisely the reverse at the start, in conformity with the proposals of the Commission on Armoured Concrete, which have been adopted by the French Minister of Public Works. But it is well to note that spirally reinforced constructions calculated according to these instructions give more security than armoured constructions.

Experimental Proofs.

The complete success of the direct driving without cap or dolly of the 900 piles at Noisiel and Mulhouse has proved conclusively by exceptional practical experience the results of the tests made in the various laboratories of France and other countries.

WIND-PRESSURE ON ROOFS.

By H. Slicer.

The wind travels in this country in what may be taken to be a horizontal direction. Its full force is not usually experienced by roofs in towns, for the continuity of its direction is broken by surrounding houses and the formation of streets, only isolated and exposed houses, &c., experiencing its full force.

Professor Kernot (Melbourne University) exposed various models of buildings to a blast from a blowing machine, giving a fairly steady blast of about 1 sq. ft. cross-sectional area. He found that two cases only complied with the usual assumptions made in calculations: (1) when the roof is supported on columns only, and with a free air space underneath; (2) when the roof was laid flat upon the ground and not raised on any supports. In the case of a roof built on walls carried to the eaves only, there was no pressure exerted on the roof at all, and where parapet walls were built above the eaves there was actually a tendency to lift the roof, or a negative pressure. Therefore where parapet walls are used the roof needs securely bolting down. This lifting may happen to an open lean-to shed roof, where a wind pocket may be formed, and the wind, finding no outlet, may raise the roof. Again, the wind may strike against the face of the main building and drive down on a lean-to roof of flat construction and destroy it. In both cases the calculations for horizontal pressure are useless, and in designing open sheds it is safest to use angles and tees for tensional members also, so that they shall not fail by bending if the nature of the stresses in the roof are reversed, owing to lifting tendencies.

It should also be noticed that wind bracing is always necessary for roofs of corrugated iron, as the wind catches the sides of the corrugations causing a raking tendency.

Hutton's experiments, from which the following formula has been deducted, were made upon inclined surfaces having free escape for the air on every side.

$$P_n = P(\sin^2 B)$$

where P_n=normal pressure in lbs. per sq. ft. at right angles to roof.

P=pressure of wind in lbs. per sq .ft. on a surface at right angles to its flow.

$B = 1\frac{1}{5}\theta + 18^\circ$.

θ=angle of slope of roof (angle between wind direction and roof slope).

The values of the above equation, taking a maximum wind-pressure as 40lbs. per sq. ft., have been plotted in Fig. 1, which shows that between 10degs. and 60degs. (the usual limits of roof slopes) the rise is gradual, and at 60degs. is equal to the full pressure of the wind.

Fig. 2 is a diagram of normal wind pressure for a 50lbs. pressure per sq. ft. at right angles to a vertical surface.

Authorities differ as to the amount of pressure to be allowed, but 40lbs. per sq. ft. of vertical surface is a good figure, and seems to agree with the above formula and tests.

The following table gives the pressure in lbs. per sq. ft. due to velocity of the wind in miles per hour.

Velocity in miles per hour	Pressure in lbs. per sq. ft.
1	·005
15	1·125
25	3·125
30	4·5
40 (High Wind)	8·0
50 (Storm)	12·5
60 (Violent Storm)	18·0
80 (Hurricane)	32·0
100 (Violent Hurricane)	50·0
126 (Gust observed in England in 1866)	80·0

The pressure of wind due to a certain velocity can be got from $P = 0·0054\,V^2$ (P=pressure and V=velocity), but the value 0·0054 has been found experimentally to be too high, as the impinging air is of greater area than the exposed surface, and the whole of the air does not have its direction of flow changed, and draws other air away with it, as the table of air pressure on the large gauge on the Forth Bridge shows the pressure at the margin of the gauge to be less than at the centre. Stanton's experiments (see Proceedings I.C.E., vol. *clvi.*) give 0·0027 for the maximum pressure in the middle of the surface on the wind side.

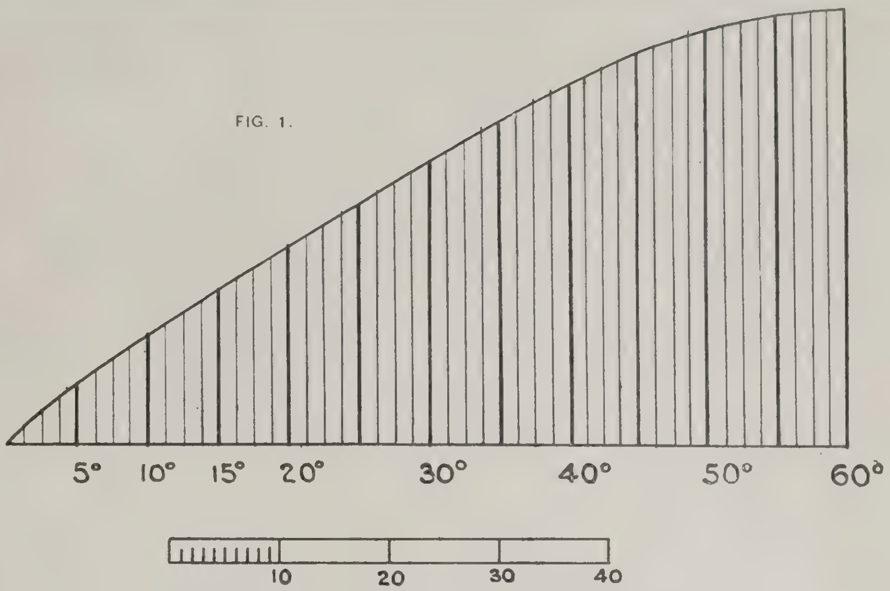
The following table from "Goodman's Mechanics" gives the relative values of pressures on roofs deducted from Hutton's experiments, compared with the theoretical values deducted from (see Fig. 3)—

$P_n = P \sin\theta$, normal pressure

Horizontal pressure, $P_h = P_n \sin\theta = P \sin^2\theta$

Vertical pressure, $P_v = P_n \cos\theta = P \cos\theta \sin\theta$

FIG. 1.



Angle of Roof.	Normal Pressure.		Vertical Pressure.		Horizontal Pressure.	
	Experiment.	$P\sin\theta$	Experiment.	$P\sin\theta\cos\theta$	Experiment.	$P\sin^2\theta$
10°	9·7	7·0	9·6	6·9	1·7	1·2
20°	18·1	13·7	17·0	12·9	6·2	4·7
30°	26·4	20·0	22·8	17·3	13·2	10·0
40°	33·3	25·7	25·5	19·7	21·4	16·5
50°	38·1	30·6	24·5	19·7	29·2	23·5
60°	40·0	34·6	20·0	17·3	34·0	30·0
70°	41·0	37·6	14·0	12·9	38·5	35·4

In the above table the experimental values have been reduced to a *horizontal* pressure of 40lbs. per sq. ft. of vertical section of air stream acting on a flat vertical surface.

The following give the relative values for the pressure on different forms of roof surfaces from various experiments.

Flat plate	1
Parachute (concave surface), depth $=\frac{\text{diameter}}{3}$	1·2 to 2
Sphere	0·36 to 0·41
Cylinder	0·54 to 0·57
Cone base to wind	0·95
Cone apex to wind	0·54 to 0·72
Lattice girders	about 0·8

Stephenson's experiments showed that the velocity (and therefore the pressure) of the wind increased according as the height above ground, the pressure varying roughly as the square root of the height above ground.

The following experiments made on the Forth Bridge has already been mentioned.

Experiment made January 25th, 1890. Small revolving gauge gave 27lbs. as pressure. Fixed ditto 24lbs. per sq. ft.; large fixed gauge 15ft. × 20ft., mean pressure 18lbs., at centre 23½lbs., at corner 22lbs.

Open flat lean-to roofs should be designed also to withstand an upward pressure of 20lbs. to 30lbs. the weight of roof covering to be deducted from this.

Weight of materials may be taken as follows for roof coverings (*Hurst*):—

	lbs. per ft. super.
Common rafters and purlins (wood trusses)	7·
Common rafters and purlins (iron trusses)	6·
1″ Deal boarding	3·33
Battens 3″ × ¾″ laid 8½″ gauge	1·32
Asphalted felt	·5
Zinc laid with rolls 12″ gauge	1·5
Zinc laid with rolls 14″ gauge	1·7
Zinc laid with rolls 16″ gauge	1·9
(Lead and copper:—add $\frac{1}{10}$ to weight per ft. super. for laps and seams.)	
Corrugated iron 20 BW gauge with 5″ corrugations (measured over all)	1·9
Corrugated iron 18 BW gauge with 5″ corrugations (measured over all)	2·6
Slates 3″ laps including nailing, all sizes excepting rags or queens	9·00
Rags and queens and nails	12·00
Tiles, plain 10½″ × 6″ × ½″ including mortar for pointing, 4″ gauge	16·00
Ceiling including joists, 10′ bearing and lath and plaster	12·00
Snow (about 5″ in this country)	3 to 10

It should be noted, however, that snow and wind rarely act together, and therefore the weight due to snow can be neglected as calculations for wind press will usually cover it.

The weight of one principal can be found approximately from the following rule:—

Let S=span in ft.

d=distance apart of principles in ft.

W=approximate weight in lbs.

For combined wood and iron truss

$$W = \tfrac{1}{2}Sd\left(1 + \frac{S}{10}\right).$$

All iron truss

$$W = \tfrac{3}{4}Sd\left(1 + \frac{S}{10}\right).$$

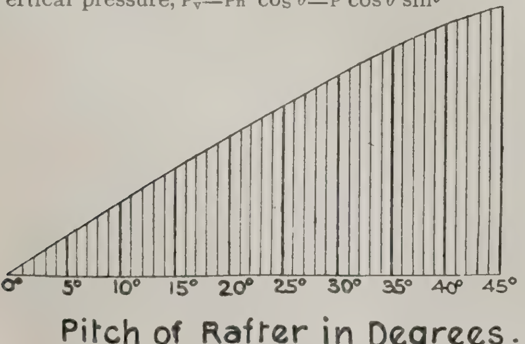


FIG. 2. PROF. CHARNOCK'S DIAGRAMS FOR MEASURING NORMAL WIND PRESSURE.

Vertical ordinates give normal pressure due to a wind pressure (horizontal) of 50 lbs. Scale 32lbs. per inch.

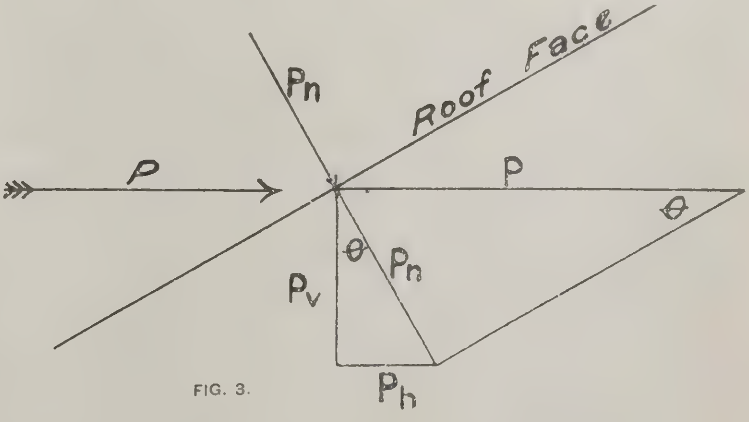
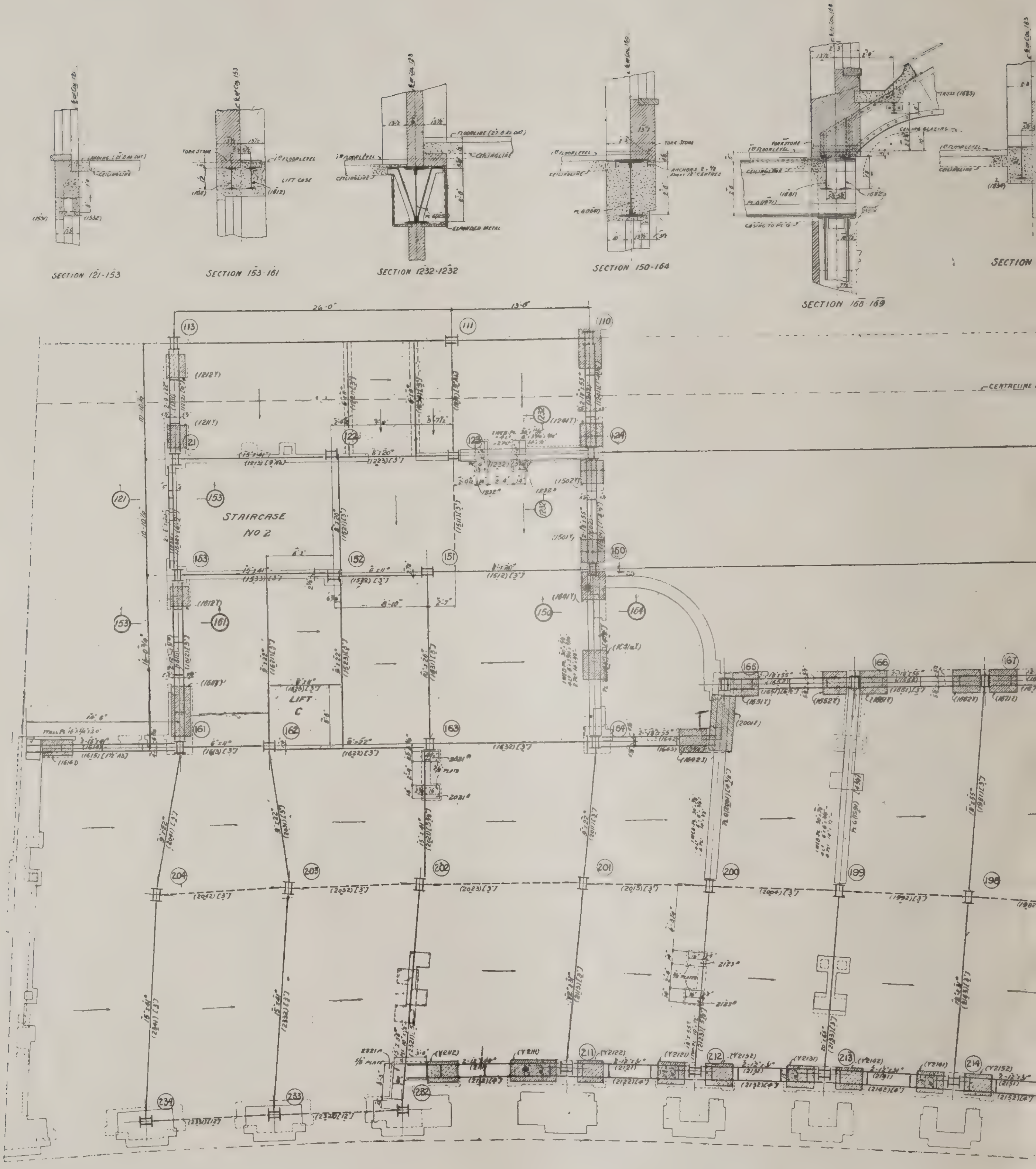
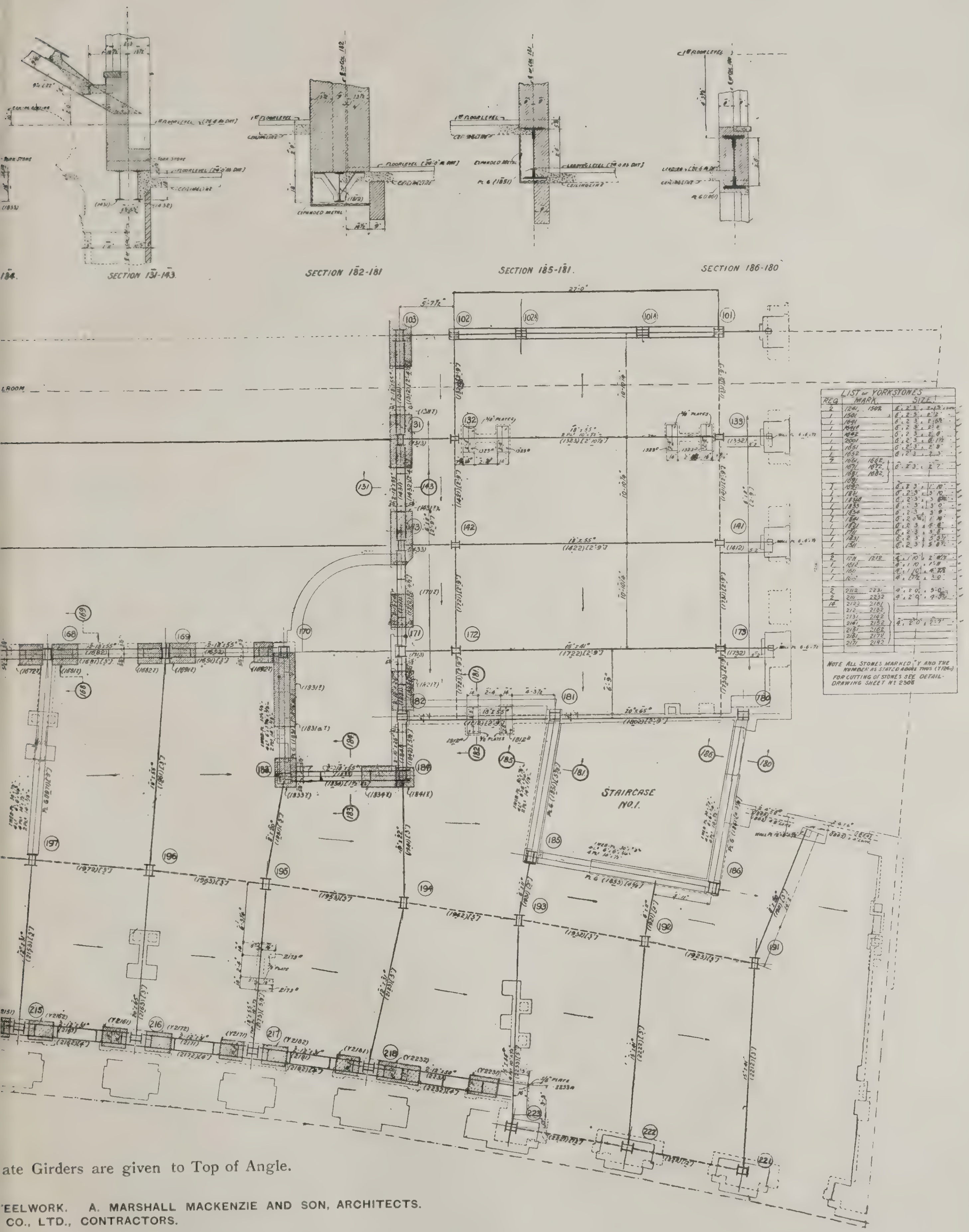


FIG. 3.



First Floor Level 26ft. 6ins. above Datum. Levels of

WALDORF HOTEL, ALDWYCH, LONDON: HALF OF FIRST FLOOR FRAMING PLAN OF
S. BYLANDER, ENGINEER. WARING-WHITE BUILD



REQ	MARK	SIZE
2	1241, 1502	6" × 2'3" × 2'4½"
1	1501	6" × 2'3" × 2'2"
1	1641	6" × 2'3" × 2'6½"
1	[illegible]	6" × 2'3" × 2'4"
1	1442	6" × 2'3" × 2'0"
1	2001	6" × 2'3" × 6'1½"
1	1651	6" × 2'3" × 2'9"
1	1652	6" × 2'3" × 2'3"
7	1661, 1662, 1671, 1672, 1681, 1682, 1691	6" × 2'3" × 2'7"
1	[illegible]	6" × 2'3" × 1'10"
1	1831	6" × 2'3" × 3'10"
1	[illegible]	6" × 2'3" × 3'[illegible]
1	1833	6" × 2'3" × 3'0"
1	1834	6" × 2'3" × 3'9"
1	1841	6" × 2'0" × 1'10"
1	1821	6" × 2'3" × 4'6"
1	1711	6" × 2'3" × 3'8"
1	1431	6" × 2'3" × 5'5½"
1	1311	6" × 2'3" × 5'8½"
2	1211, 1212	4" × 1'10" × 2'0½"
1	1612	4" × 1'10" × 1'8"
1	1611	4" × 1'10" × 4'2½"
1	[illegible]	4" × 1'7½" × 3'0"
2	2112, 2231	4" × 2'0" × 9'0"
2	2111, 2232	4" × 2'0" × 9'3"
14	2122, 2181, 212, 2182, 2131, 2142, 2141, 2152, 2151, 2162, 2161, 2172, 2171, 2192	4" × 2'0" × 2'7"

NOTE ALL STONES MARKED "Y" AND THE NUMBER AS STATED ABOVE THUS (Y124–)
FOR CUTTING OF STONES SEE DETAIL DRAWING SHEET No. 2308

ate Girders are given to Top of Angle.

TEELWORK. A. MARSHALL MACKENZIE AND SON, ARCHITECTS.
CO., LTD., CONTRACTORS.

WALDORF HOTEL.

On the preceding page we publish a framing plan of the steelwork of the Waldorf Hotel, now approaching completion, on Aldwych, London. This framing plan is only of the front half of the first floor, but it is sufficient to illustrate the general arrangement. The back of the site is square and the framing more regular. The curved frontage presented some difficulty, but simplicity of framing has been secured as shown.

REINFORCED CONCRETE CHIMNEYS.

The Weber Steel-Concrete Co., of Queen Anne's Chambers, Broadway, Westminster, S.W., have now erected in England a reinforced concrete chimney 250ft. high at Plaistow Wharf, Victoria Docks, London, for Messrs. Abram Lyle & Sons, and a chimney 247ft. high at Gravesend for the Associated Portland Cement Manufacturers, Ltd., while five more chimneys are in course of construction—namely, one 200ft. high at Purfleet for the Thames Paper Co., Ltd.; two, each 120ft. high, at Neath, South Wales, for the Cape Copper Co., Ltd.; one 120ft. high at Coventry, for Messrs. Merry & Cuninghame; and another 75ft. high at Addisham, Kent, for the Foncage Syndicate, Ltd. The English office of the company has also secured contracts for two reinforced concrete chimneys in France—namely, one 64·5 metres high for Messrs. Tricon & Co., Vitry-sur-Seine, Paris, and another 40 metres high for Messrs. Niclausse Bros., Paris. This is an altogether remarkable progress for such a short time as the company has been established in this country. As regards the progress of the company in America, over 200 chimneys have already been erected in the United States, while fifteen have been erected in Canada.

REINFORCED CONCRETE SYSTEMS.

XV.—The Wells System.

Mr. E. P. Wells (of 94, Larkhall Rise, Clapham, London) introduced his system of reinforced concrete construction in 1904, since when its application has been very extensive.

Mr. Wells is an engineer of wide experience, and is undoubtedly one of the foremost experts in the theory and practice of concrete construction (plain and reinforced), having carried out elaborate experimental research. Mr. Wells was born in England, but in his youth removed to Australia, in 1857, and assisted his uncle, Mr. George Wells, an engineer, in the erection of Cape Jaffa Lighthouse, a wrought-iron structure, in 1869. He was articled to his uncle, and was engaged in the design and construction of further lighthouses and other work. He returned to England in 1872 and passed through the works of Messrs. Hawks, Crawshay and Sons, of Gateshead-on-Tyne, a now defunct firm, who then had large rolling mills and were marine and general engineers, &c. Having designed the wrought-iron Tippara Reef Lighthouse on the South Australian coast, he went out there in 1876 and erected it. He afterwards designed and erected several piers in Australia, and again returned to England in 1881, joining Colonel Lay and Mr. Nordenfelt in the design and construction of locomotive torpedoes, shortly afterwards entering the engineering department of the Metropolitan Board of Works, succeeded by the London County Council, where he had a varied experience. While with the L.C.C. Mr. Wells was responsible for the first proposed design for Vauxhall Bridge in concrete, for which purpose he carried out, six years ago, a most extensive series of experiments on cements and concretes. He recorded some of the results of these researches in two lectures on "Cement and Ferro-Concrete in Arches, &c.," delivered in March, 1903, at the School of Military Engineering, Chatham, and printed in the professional papers of the Corps of Royal Engineers.

In this way Mr. Wells's attention became attracted particularly to the subject of reinforced concrete, and, seeing the troubles arising in other systems from the use of loose shear members, he conceived the basic idea of a system without such loose members, and in June, 1904, took out a patent (No. 12625 of 1904) for a system using for shear reinforcements indented hoop-iron twisted round the rods, these last consisting of twin rounds joined by a diaphragm, in which holes could be punctured for the insertion of shear members, or split to allow the one half to be cranked up at the point of contraflexure. This patent was accepted at the end of April, 1905. He took out a further patent in March, 1905, for the construction of reinforced concrete floors and beams only partially *in situ*, moulded beams and slabs being hoisted into position and fixed without forms being required. This specification (No. 4977 of 1905) was accepted in June, 1905. Legal proceedings led to the slight amendment of the first specification in November, 1905. Mr. Wells left the service of the London County Council in January, 1906, to undertake work on this system, beginning with a large job—namely, the Royal Engineers Electricity Schools at Chatham.

We may here mention that Mr. Wells has taken out patents also in the United States, Germany, the Cape, Transvaal, Natal, and India. His system is at present being worked in England and America only.

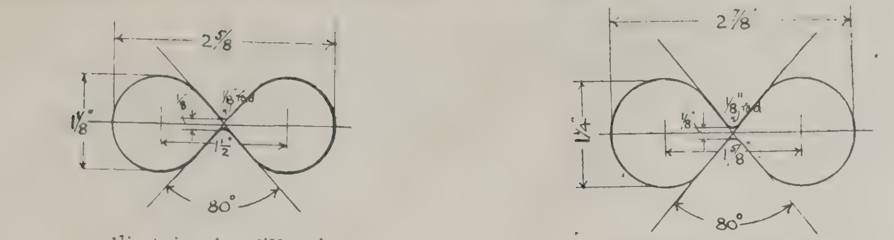
Rods and Shear Members.

Mr. Wells makes use of plain round rods or his patent twin rods as occasion warrants. Thus, in beams carrying light loads he uses plain rods often, and in floor slabs and pillars exclusively. In beams with heavier loads he adopts his twin rods, the standard sections of those at present rolled being given in Fig. 1. For shear reinforcements he adopts his patent indented hoop-iron. The indentations are cheaply and quickly made by a small machine and give a mechanical bond which is very necessary in the particular purpose for which this hoop-iron is used, as well as with a reinforcement having flat surfaces, the adhesion of which is notably deficient. The ends of the hangers are just turned round the rods, as shown in Fig. 2, and do not take a stirrup form. When a hanger is used with a twin rod a hole is punched in the diaphragm for its insertion, as shown in Fig. 3. Bonders consisting of short pieces of dented hoop-iron are inserted to secure a thorough bond between the layers of concrete in which a beam is brought up to the full depth, and also to resist the shear along the line of junction between the rib and the flange of a T beam. The hangers and bonders are usually made of $1\frac{1}{2}$in. by $\frac{1}{16}$in. wrought-iron or steel hoop, but often 2ins. by $\frac{3}{32}$in. hoop is used, and sometimes heavier if necessary

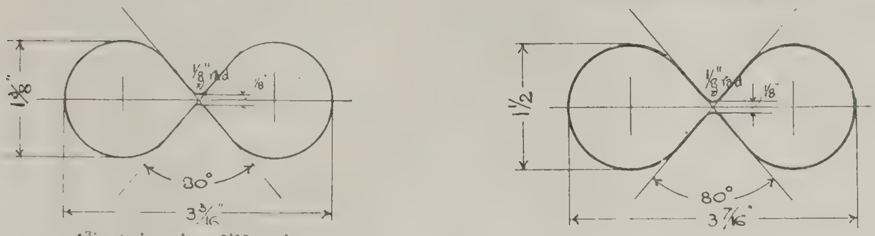
Beams.

Reinforced concrete beams are almost universally T shaped. Mr. Wells varies his reinforcement for beams according to circumstances. In beams of short span and light loads, where the stresses are fairly constant throughout the width, straight round rods are generally used (see Fig. 2). Where such beams are independent the rods are at the bottom only. Lintels belong to the category of independent rectangular beams, and we illustrate an example in Fig. 4. When the beams are continuous, short lengths of rod are placed at the top over the points of support to resist the reversed bending moments there produced. If, as occasionally happens, the section of concrete is insufficient to resist the compressive stresses at the centre of a beam, top rods are introduced. In continuous beams the underside over the supports is usually deficient in this respect, and the bottom rods being run through serve to assist the concrete to take care of the compression. Dented hoop-iron hangers are used to resist shear, and bonders to assist them in bonding the layers of concrete together and to resist horizontal shear at the junction of rib and flange.

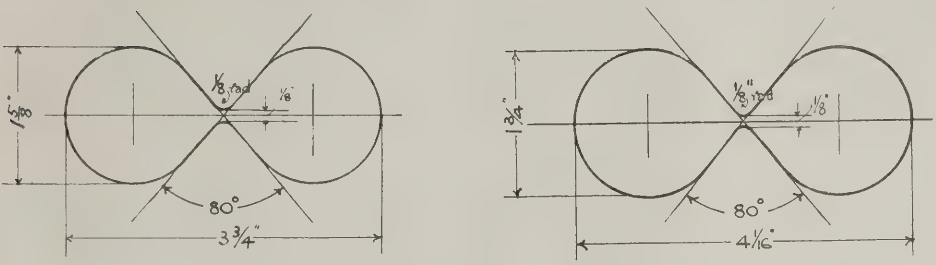
With T-shaped beams of wider span the stresses vary considerably across the span, and the reinforcement does not take such a simple form. Mr. Wells usually adopts in such cases his twin rods. In the secondary and lighter beams the effective depth of the beam is increased by laying these twin bars on the flat, as shown in Fig. 5. In such cases the full section of each rod is available at the centre of the span, but from the point of contraflexure towards the supports the twins are split in two, one half being cranked up. If the beam is built in the wall the form taken is that shown in Fig. 6. The tension at the top of the beam where built-in is resisted by the cranked-up half of the twin bar, and the excessive compression below resisted by the half which is allowed to run straight through. When the beam is continuous the arrangement over the support is as shown in Fig. 5. The halves of each twin rod are carried some distance past the support into the next bay. Thus the greater sectional area of reinforcement necessary to resist the stresses in continuous beams is secured, for there are then two rounds above and two below. These rounds do not require cranking to pass each other, nor has the width of concrete to be increased, for the right-hand half in one bay is bent up at the point of contraflexure and the left-hand half in the next bay, so that the halves lie side by side above and below. (See Figs. 9 and 10.) In the case of heavier and deeper continuous beams, the large sectional area of steel required, if made up of twins laid flat, would inordinately increase the thickness. The twins are therefore placed upright, as shown in Fig. 7. As before, the rods are split at the point of contraflexure and bent up. In the particular example illustrated they are not carried over the supports because cast-iron columns are used, a separate round rod being placed as shown to secure continuity. Ordinarily, however, they would pass over the supports as in Fig.



1⅛in. twin. Area 2·09 sq. ins. 1¼in. twin. Area 2·57 sq. ins.



1⅜in. twin. Area 3·13 sq. ins. 1½in. Area 3·72 sq. ins.



1⅝in. twin. Area 4·37 sq. ins. 1¾in. twin. Area 5·05 sq. ins.

FIG. 1. STANDARD SECTIONS OF WELLS TWIN BARS.

5, except that where the halves coming from adjoining bays meet, one has to be cranked over the other in order to pass. The connection to a transverse beam at an end bay in Fig. 7 should be ncted.

Mr. Wells's method of largely doing without centering by only partly-forming beams *in situ* is shown in Fig. 8. The portions which are moulded on the bench are grooved, and also have reinforcements projecting, so as to securely bond with the concrete deposited *in situ* and secure a monolithic construction.

Shear.

Shear stresses in beams, as before stated, are resisted by the hangers and bonders. In lighter beams, reinforced with plain round rods, the resistance to sliding of the bonders is ample without rigid attachment. When twin rods are adopted the bonders are rigidly attached to the bars by being carried through holes punched in the diaphragm at the centre of the beam, and at the ends of the beam by being bent round both top and bottom. (See Figs. 9 and 11.) The inclined portions of the rods at the points of contraflexure also resist a great deal of the shear, and, of course, are also rigidly attached.

The dents in the hoop-iron hangers and bonders are a great feature of the Wells system. There is little adhesion of concrete to flat surfaces, and the length of shear reinforcements is small; a mechanical bond is therefore doubly necessary, and this Mr. Wells secures by the hollows and projections of these dents.

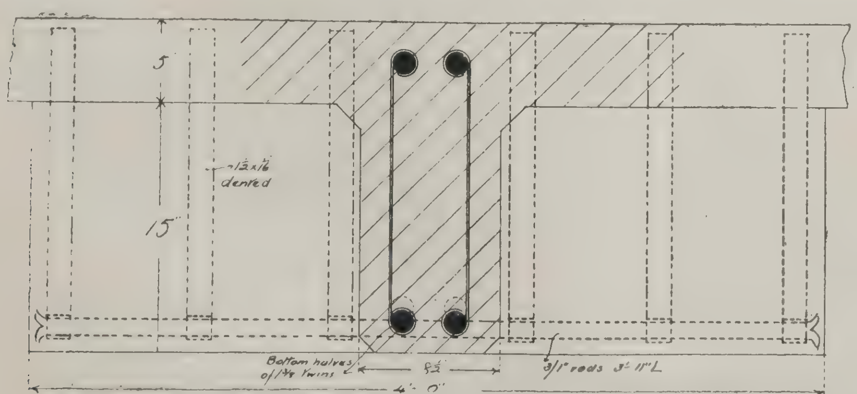
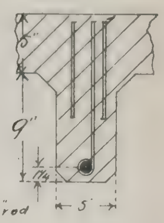


FIG. 4. DETAIL OF LINTEL.

FIG. 2.

SECTION OF BEAM WITH ORDINARY ROUND ROD REINFORCEMENT SHOWING DENTED HOOP-IRON HANGER AND BONDERS.



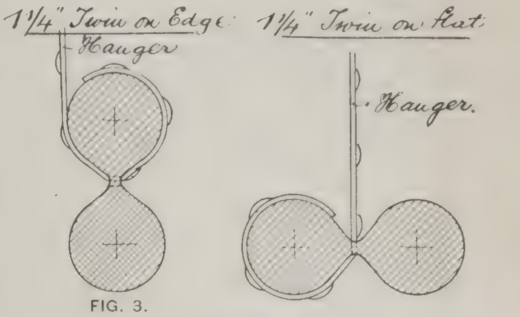


FIG. 3.

Floor Slabs.

For the reinforcement of floor slabs Mr. Wells uses round rods only. The chief reinforcement usually runs only one way (the shortest span), the section and pitch of rods being varied according to span (it is preferable to only vary the pitch if possible), but rods ¼-in. diameter by 12in. pitch are always placed at right angles for the purpose of distributing any isolated loads or sudden impacts. The intersections are not wired unless the slabs are of large span; the rods then require keeping in place during construction. It was early found by Mr. Wells that, quite apart from the economy in steel resulting from continuity of span, it was advisable to place top reinforcing rods over the supporting beams, for otherwise cracks (not dangerous) appeared there. The arrangement at supports is clearly shown in Figs. 5 and 9.

Double Floors

are not usual construction, but Mr. Wells favours a suspended fibrous plaster ceiling resting on a ledge formed on the beam.

Roofs.

Flat roofs are mostly customary—and are treated as lightly loaded floors. Inclined roofs are also constructed very similarly to floors. The principals and purlins are simply inclined beams; the roof slabs are bonded thereto by the bonders and hangers, and tendency to sliding thereby resisted.

The Reinforcement of a Cantilever.

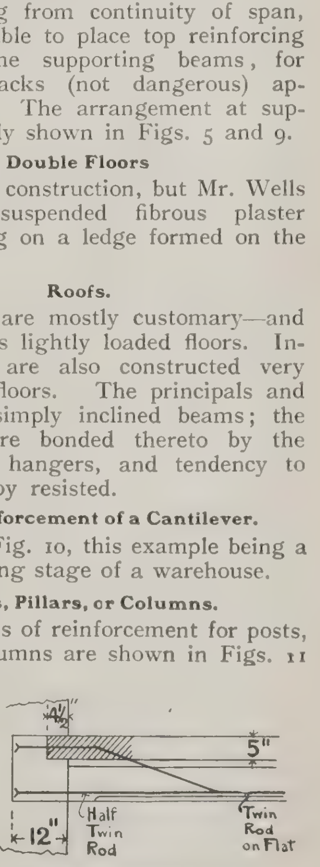
is shown in Fig. 10, this example being a balcony landing stage of a warehouse.

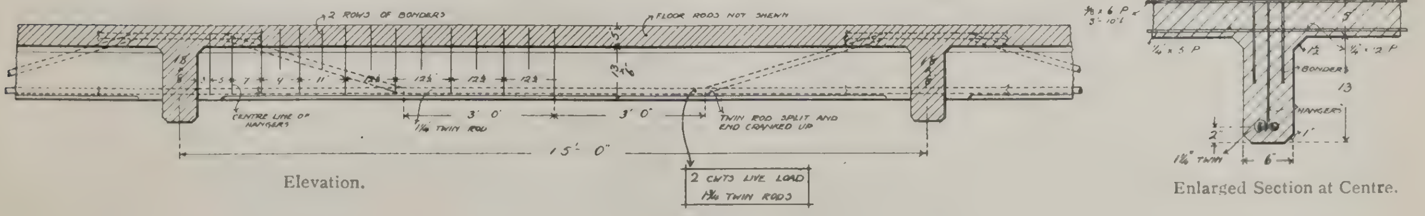
Posts, Pillars, or Columns.

Three forms of reinforcement for posts, pillars or columns are shown in Figs. 11

FIG. 6.

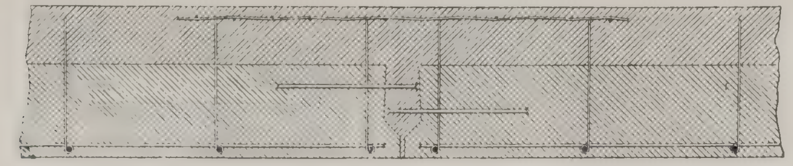
DETAIL AT END OF BUILT-IN BEAM.



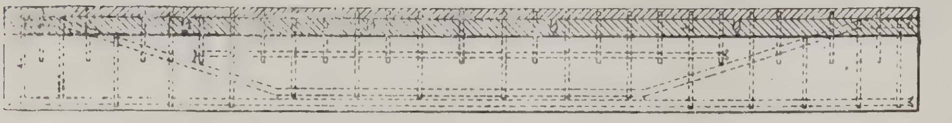


Elevation. Enlarged Section at Centre.

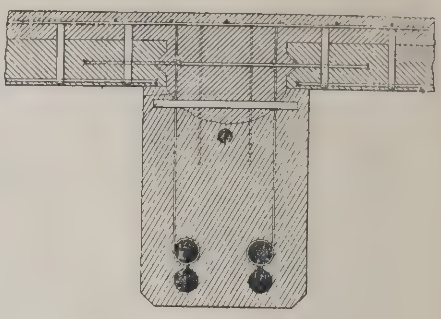
FIG. 5. REINFORCEMENT OF SECONDARY BEAM.



Enlarged section showing junction of floor slabs.

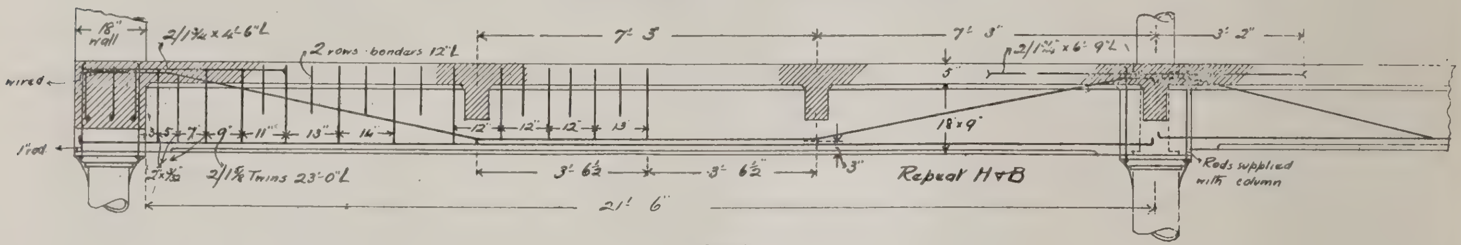


Elevation.

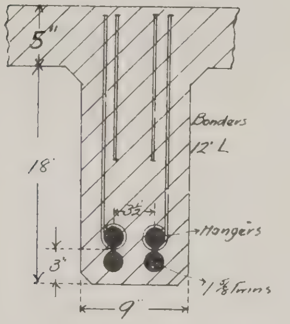


Enlarged section at centre.

FIG. 8. REINFORCEMENT OF A MOULDED BEAM.



Elevation.



Enlarged section at centre.

FIG. 7. REINFORCEMENT OF A MAIN BEAM.

and 12. In the former it will be seen that for a smaller pillar Mr. Wells uses round rods for his links, with ends turned over to interlock. Another variant shown in Fig. 12 is to place links with ends overlapped, and penetrating into the centre of the column. For larger pillars, in addition to circumferential links, transverse links are adopted, as shown in Fig. 11, and for very large pillars diagonal links similar to the transverse links are added as well. Fig. 11 also shows the foundation to a pillar

Mr. Wells has had on several occasions to use hollow cast-iron and solid steel columns in conjunction with reinforced concrete floors, with the object of saving space, and the method of securing adequate connection having been solved in an interesting way, we illustrate in Figs. 7 and 13 various details where cast-iron columns were used. The columns continue a short distance above the caps, and are cut away to let the rods enter. The ends of the rods are turned over to lock in securely. Short lengths of rods pass through the cap, being either cast in, screwed in, or bolted through, and rods are also passed up the hollow centre of the columns, which are filled with extra good concrete.

Walls.

It is not generally economical to build reinforced concrete walls to buildings, but where walls have to sustain considerable lateral pressure, as in retaining walls, reservoirs, tanks and silos, they are advantageous. The form of reinforcement adopted in such cases by Mr. Wells is shown in Fig. 14, consisting on each side of horizontal and vertical rods, the latter joined by links.

Materials.

As mentioned above, Mr. Wells has made elaborate investigations regarding cements and concretes. As a rule he uses crushed ballast for the aggregate, with the best finely-ground Portland cement. Crushing tests are always carried out with the actual cement and aggregates to be used before a job is commenced and proportions adopted in accordance with results—a practice which should always be adopted by designers. For special work, such as columns where good concrete is of the utmost importance, the best cement is used with a rich mixture, the aggregate being carefully washed. Some remarkable results have been obtained by Mr. Wells in tests, as much as 416 tons per sq. ft. being obtained on 1 to 5 concrete at 1 month. The safe

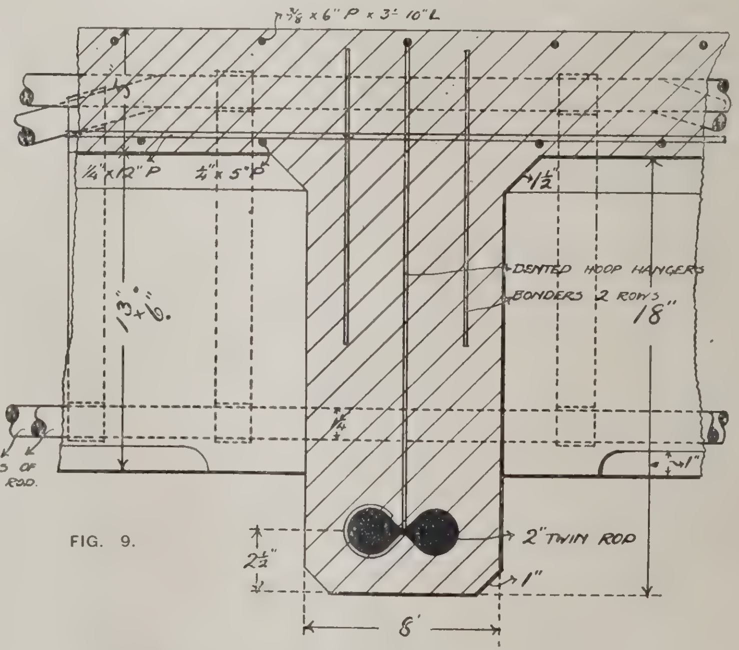


FIG. 9.

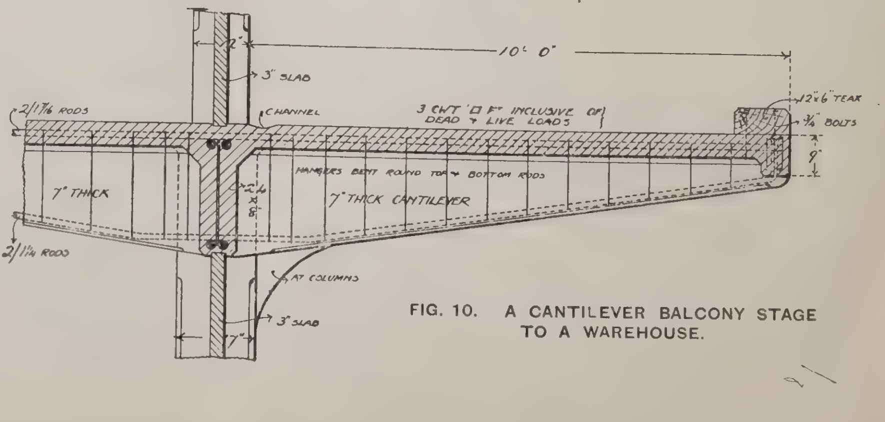


FIG. 10. A CANTILEVER BALCONY STAGE TO A WAREHOUSE.

constants he uses in designing are 600lbs. per sq. in. for crushing with ordinary 5 to 1 concrete giving 200 tons per sq. ft. ultimate strength at 6 weeks. As the result of tests Mr. Wells is inclined to put the ultimate shearing strength of concrete at about 500lbs. per sq. in. or even higher.

The reinforcements, both of plain round and twin rods, are of mild steel with an ultimate tensile strength of 28 to 34 tons per sq. in. Mr. Wells adopts 8 tons per sq. in. as the safe strength, except where there are heavy moving loads, when the stress is proportionally reduced.

Calculations.

Mr. Wells is not a believer in elaborate formulæ. In designing it is important to adopt quick and easy formulæ, so as to be economical of time and labour and not be liable to serious risk of error through mistakes. He has, therefore, from the study of the most modern theory drawn up empirical formulæ which are safe owing to the conservative constants adopted.

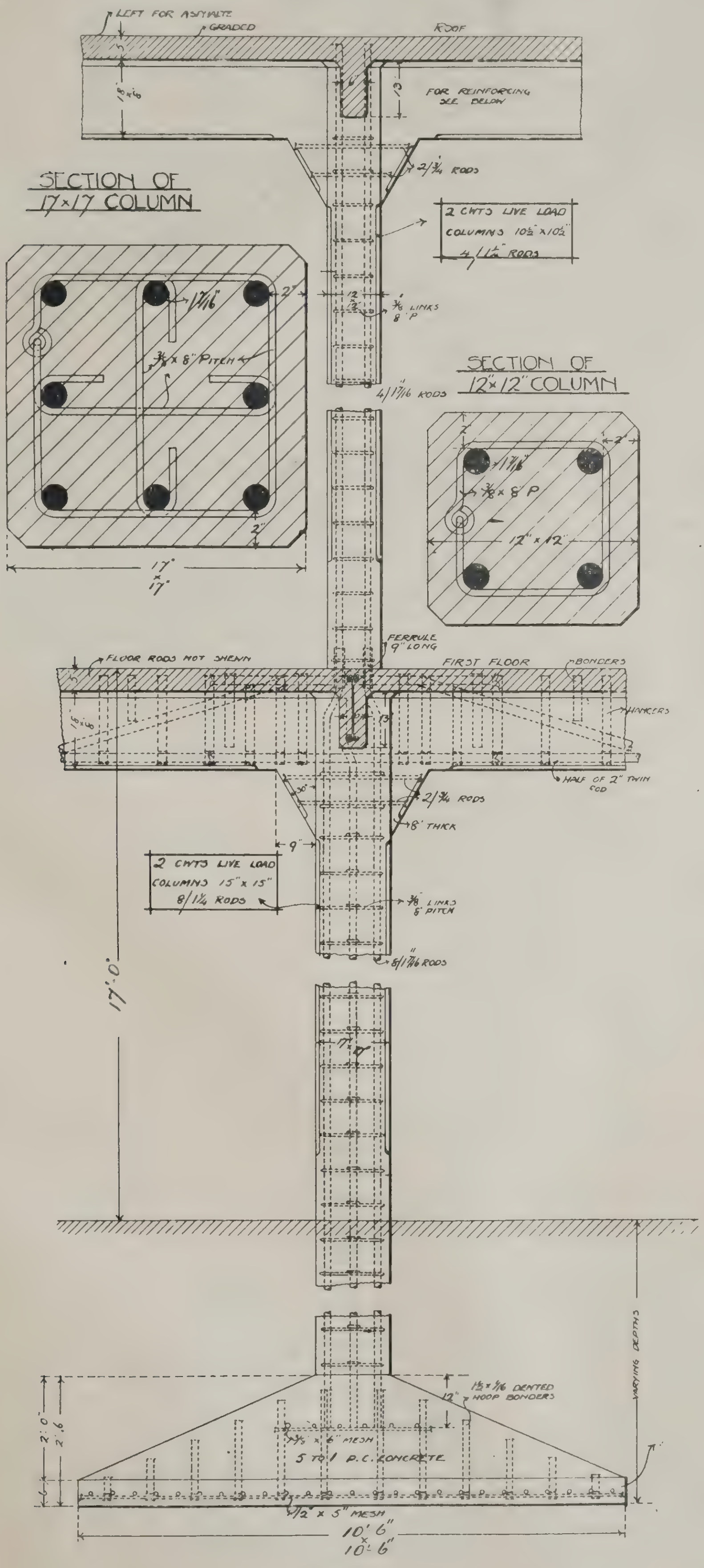


FIG. 11.

For floor slabs Mr. Wells equates the bending moment against the area of the steel in tension multiplied by the safe stress per sq. in. and by a leverage arm of ·83 of the depth from the axis of the reinforcement to the top of the slab. The resistance of the concrete is generally ample, but if necessary to consider it, the area of concrete assumed to act in compression is taken at $\frac{1}{3}$ the depth, and the stress on this area is taken as equally distributed. If the stress exceeds 600lbs. per sq. in. top reinforcement is added. Mr. Wells considers, as the result of tests, that the safe compressive resistance of concrete at 6 weeks is 800lbs. per sq. in., so that ample margin is allowed. The thickness of floor slabs is usually made $\frac{1}{16}$th of the span, but for heavy loads $\frac{1}{12}$th would be adopted.

For T-beams Mr. Wells adopts the conservative width of 5ft. for the table or flange. The depth of the rib from the axis of the tensile reinforcement to the underside of the floor slab is usually taken at $\frac{1}{16}$th of the span; for light loads $\frac{1}{20}$th migh be used, and for very heavy loads sometimes $\frac{1}{10}$th or $\frac{1}{12}$th is adopted. The bending moment is equated against the area of steel in tension multiplied by its safe stress per sq. in. and by the leverage arm from the axis of the tensile reinforcement to half the depth of the floor slab. As regards the compressive resistance of the concrete, the whole of the table or flange of the T is reckoned to take equally 600lbs. per sq. in. with safety. When this limit is exceeded reinforcement

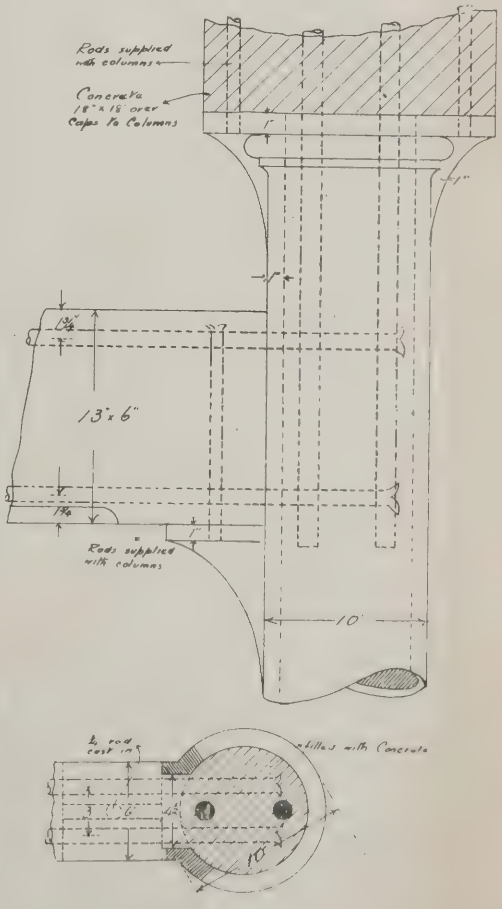

Rods supplied with columns
Concrete 18"×18" over Caps to Columns
1"
1"
1"
1¾"
13"×6"
1¾
1"
Rods supplied with columns
10"
½ rod cast in
filled with Concrete
3
6
4½
10

FIG. 13.

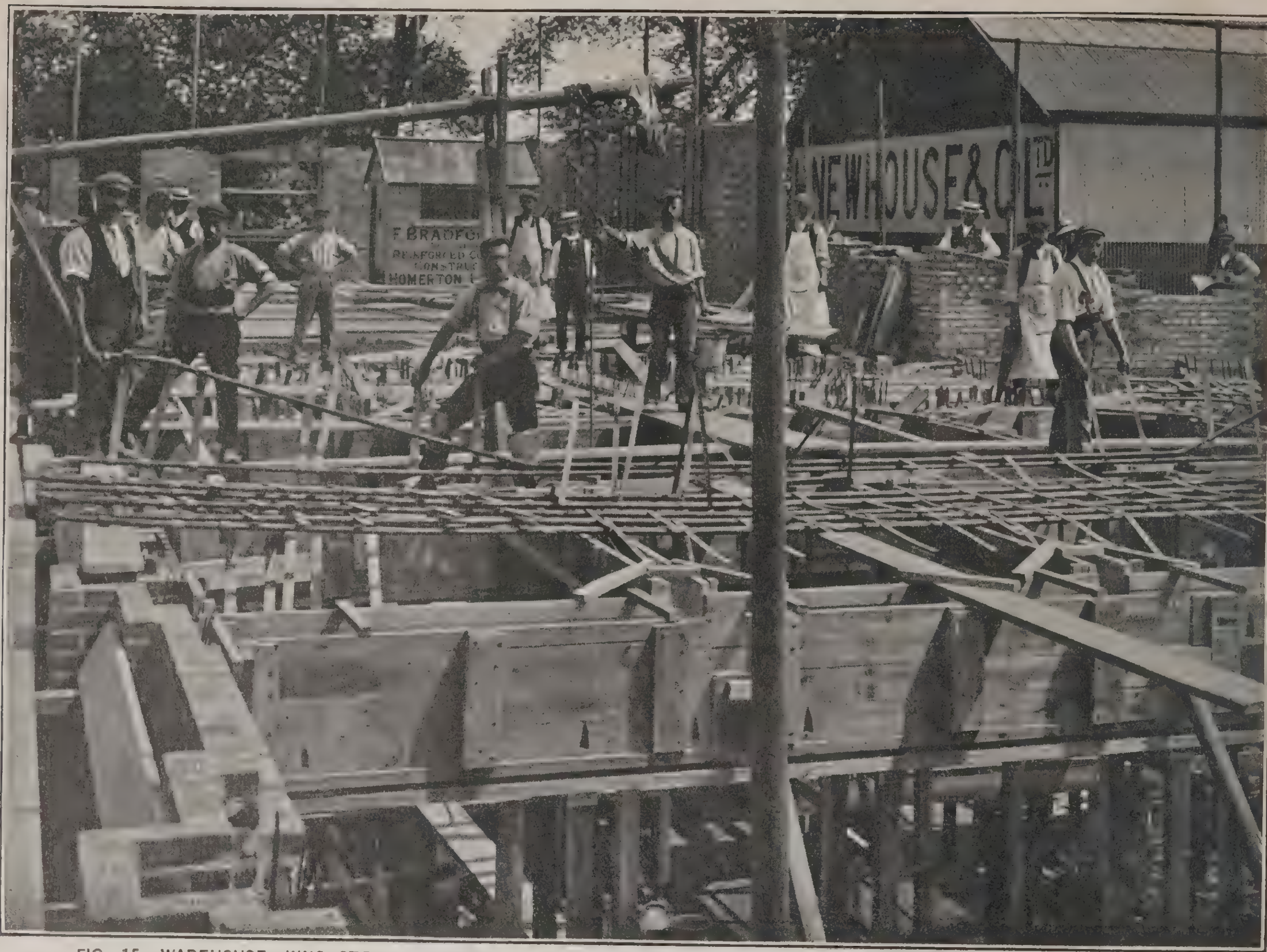


FIG. 15. WAREHOUSE, KING STREET, NORWICH SHOWING FLOORS ON WELLS SYSTEM IN COURSE OF CONSTRUCTION.

is placed at the top in the centre of the floor slab. The width of the rib is merely made sufficient to embed the reinforcement; the rods are usually spaced 3ins. centre to centre, with a minimum of 2½ins., and a minimum of 2ins. of concrete is put outside. The hangers and bonders are ample to resist shear along the plane of junction between rib and flange.

In pillars Mr. Wells assumes that the whole area, inclusive of steel and concrete, will safely carry 900lbs. per sq. in., of which the steel will take 300lbs. per sq. in. and the concrete 600lbs. per sq. in. This gives 4½ per cent. of the total section for the sectional area of steel required. He assumes that the setting of the concrete puts over 2 tons per sq. in. initial compression into the steel, which he keeps 3ins. in from the outside.

Practice.

There are a good many practical advantages offered by the Wells system. Much of the manipulation of the reinforcement is done in the shop—that is to say, the twin rods are slotted, split, and cranked, and the hangers and bonders dented before the reinforcement is sent on the job. The slotting and splitting of the diaphragms of twin rods are both alike performed by means of one small machine, electrically driven, having a 2-in. punch. Fig. 15 shows a floor in course of construction, and it will be noticed that there are no loose members except the bonders inserted at the top of a beam. This view also shows the centering, which is of the ordinary kind.

It is very important that reinforcements should be in their correct position as designed, both for strength and fire-resistance. There is some risk in this as a rule, for the ramming tends to displace them unless special precautions are taken. With the Wells twin rods exactitude is easily secured. The bars are in themselves more rigid than round rods, and they are suspended the right distance above the underside of a beam by putting small pieces of wood under their cranked up ends on top of the shuttering, as shown in Fig. 16. For fire-resistance 1¼-in. protection is usually provided in beams and ⅜-in. in floor slabs. The twin rod also allows concrete to get into every part, whereas when rods are superimposed (as is necessary when beams of reasonable width are required, which is desirable both for economy and appearance) the concrete cannot be thoroughly worked round the bars.

In our issues for May 23rd, June 20th, October 10th, and November 7th, 1906, we published a set of working drawings for the reinforced concrete floors, roofs, &c., of the annexe to the "Dundee Courier" building, which illustrate the way in which Mr. Wells clearly indicates details, as well as being of constructive interest.

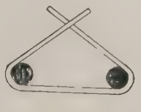


FIG. 12.

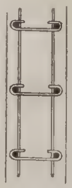


FIG. 14.

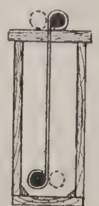


FIG. 16.

Contracts.

Mr. Wells insists strongly upon the importance of good workmanship and expert knowledge as regards the manufacture of the concrete, which should be of the best. Messrs. Stuart's Granolithic Co., Ltd., of Glengall Road, Millwall, E., are the chief contractors working the Wells system and they are one of the oldest and best-known firms of concrete specialists, who have a reputation for making concrete of remarkably high quality. Messrs. Stuart, it may be mentioned, have employed steel rods for reinforcing concrete for over 20 years.

The following is a list of works which have been, or are being, carried out on the Wells system :—

Floors, &c.: Electrical School, Chatham; stables, &c., Whitecross Street, London, E.C.; Star Laundry, Hackney, London; warehouse, King Street, Norwich; warehouse, Sculcoates, Hull; offices, 103-104, Cheapside, London; Japanning Stoves, Beeston; warehouse, Barking; Newcastle Grammar School; new Law Courts, Hull; "Courier" Building, Dundee; Technical Institute, Rochester; premises, High Street, Manchester; Shire Hall, Bury St. Edmunds; Technical Institute, Erith; premises, Galleywall Road, London; chocolate factory, Portobello; schools, Kingston; factory, Spa Road, Bermondsey; Messrs. Reckett's factory, Hull; lead mills, Millwall, London; offices, 39, Gt. Windmill Street, London; Lympore Castle, Kent; Esk Mills, Musselburgh; schools, Ranelagh; stables, Erdington; schools, Haverhill; Hackney Furnishing Co.'s premises, Hackney, London; schools, Royton; Grammar School, Maldon; "Venesta" warehouse, Millwall, E.; private house, Little Hampden; warehouse, York Road, London, N.: warehouse, Manchester; schools, Davidson Road, London; Garscube Road Stores, Glasgow; "Inglewood," Bromley; Great Central Railway. Sheffield. *Retaining Walls, Raft, &c.:* County Council Offices, Norwich. *Roofs:* Cripples' Home, Southend; "Cross Keys," Moorgate Street, London. *Strong Rooms:* One in London, six in Dundee. *Tanks:* For Messrs. Schweppes at Addison Road. London: another in the Isle of Grain; one at Mansion House Chambers, London, E.C., and one for 838,000 gallons of creosote, Hull. *Reservoir:* (Covered) at Beeston.

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